United States Environmental Protection Agency
Office of Solid Waste Washington, D.C. 20460
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Capacity Analysis for Land Disposal Restrictions—Phase IV: Newly Identified Toxicity Characteristic Metal Wastes and Mineral Processing Wastes (Final Rule)

Background Document

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

CHAPTER 1
INTRODUCTION

This document presents the capacity analysis for surface-disposed wastes[1] that EPA conducted to support the Land Disposal Restrictions (LDRs)—Phase IV: Issues Associated with Treatment Standards for Newly Identified Mineral Processing Wastes and Toxicity Characteristic Metal Wastes. EPA conducts capacity analyses to evaluate the need for national capacity variances from the land disposal prohibitions. The capacity analysis provides estimates of the quantities of wastes that will require alternative commercial treatment prior to land disposal as a result of the LDRs and estimates alternative commercial treatment capacity available to manage wastes restricted from land disposal. In this rule, EPA is promulgating LDRs for the newly identified mineral processing wastes and toxicity characteristic metal wastes that have not been covered in previous LDR rulemakings. The following sections provide additional details on the legal background and overall methodology for this capacity analysis. A summary of results also is provided.

1.1 LEGAL BACKGROUND

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

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

Once the LDRs are finalized, the wastes must meet the treatment standards prior to be disposed unless the Agency grants a national capacity variance because of a lack of available treatment capacity (see

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[1] This document only addresses surface-disposed wastes. Wastes managed in Safe Drinking Water Act (SDWA) underground injection wells are addressed in a separate document.

[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)).

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

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

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

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

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

EXHIBIT 1-1
SUMMARY OF PREVIOUS LAND DISPOSAL RESTRICTIONS RULEMAKINGS

Rulemaking	Federal Register Notice	Promulgation Date
Solvents and Dioxins (surface disposed)	51 *FR* 40572	November 7, 1986
Solvents and Dioxins (deep well injected)	53 *FR* 28188	July 26, 1988
California List (surface disposed)	52 *FR* 25760	July 8, 1987
California List (deep well injected)	53 *FR* 30908	July 26, 1988
First Third Rule	53 *FR* 31138	August 8, 1988
First Third Rule (deep well injected)	54 *FR* 25416	June 7, 1989
Second Third Rule	54 *FR* 26594	June 8, 1989
Third Third Rule	55 *FR* 22520	May 8, 1990
Newly Listed and Identified Wastes (Phase I)	57 *FR* 37194	June 30, 1992
Interim Final Rule for Vacated Treatment Standards	58 *FR* 29860	May 24, 1993
Organic TC Wastes and Newly Listed Wastes (Phase II)	59 *FR* 47982	September 19, 1994
Decharacterized Wastewaters, Carbamate Wastes, and Spent Potliners (Phase III)[a]	61 *FR* 15565	April 8, 1996
Wood Preserving Wastes ("Mini" Phase IV)	62 *FR* 25998	May 12, 1997

[a] On August 26, 1996, the Agency revised the carbamate waste treatment standards and set the effective date for one year from the date of publication ("Emergency Revision of the Land Disposal Restrictions (LDR) Phase III Treatment Standards for Listed Hazardous Wastes from Carbamate Production," 61 *FR* 43923). On January 14, 1997, the Agency extended the national capacity variance for spent potliners (K088) for six months ("Land Disposal Restrictions Phase III - Emergency Extension of the K088 Capacity Variance; Final Rule," 62 *FR* 1991). On July 14, 1997, the Agency extended the national capacity variance for K088 wastes for three additional months (62 *FR* 37693). Thus, K088 wastes became subject to LDR treatment standards on October 8, 1997.

1.2 CAPACITY ANALYSIS METHODOLOGY

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

1.2.1 Overall Approach

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

1.2.2 Determination of Required Commercial Treatment Capacity

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

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

To determine the type of alternative capacity required to treat the affected wastes, EPA conducts a

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[5] EPA also derives estimates of affected facilities and waste quantities for the regulatory impact analysis. Both the regulatory impact analysis and the capacity analysis examine wastes in the industrial sectors likely to generate most of the affected wastes. However, the goals of a capacity analysis and a regulatory impact analysis are very different, which often results in some differences in methodologies, data, and results. In contrast to the capacity analysis' focus on required and available capacity during the next two years and its initial focus on threshold determinations, the regulatory impact analysis concentrates on estimating specific potential long-term costs and benefits of the LDR treatment standards. Typically, only the significant (or dominant) costs and benefits are assessed during the regulatory impact analysis. In summary, therefore, differences between the goals of the capacity analysis and the regulatory impact analysis are expected to result in reasonable differences in the methodologies, data, and results.

"treatability analysis" of each waste stream. Based on the waste's physical and chemical form and information on prior management practices, EPA assigns the quantity of affected waste to an appropriate technology (i.e., a technology that can meet the treatment standards). Mixtures of RCRA wastes (i.e., waste streams described by more than one waste code) present special treatability concerns because they often contain constituents (e.g., organics and metals) requiring different types of treatment. To treat these wastes, EPA develops a treatment train that can treat all waste types in the group (e.g., thermal treatment followed by stabilization). In these cases, the Agency estimates the amount of residuals that would be generated by treatment of the original quantity of waste and includes these residuals in the quantities requiring alternative treatment capacity.

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

1.2.3 Determination of Available Commercial Treatment Capacity

The analysis conducted to determine available commercial treatment capacity focuses on treatment capacity projected to be available for the two years following the effective date of the LDRs, starting from the baseline capacity identified in the previous final LDR rule, in this case the "Mini" Phase IV (62 *FR* 25998, May 12, 1997).

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 capacity analyses, estimates on available capacity reflect available commercial capacity. The determination of available capacity focuses on commercial facilities. Consequently, most estimates of capacity presented in this document represent commercially available capacity. In order to determine whether to grant a national capacity variance for newly listed and identified wastes regulated in today's final rule, EPA analyzed available commercial capacity for alternative treatment technologies capable of meeting the LDR treatment standards. This capacity analysis generally included estimating the maximum or design capacity for appropriate waste management systems and the amount of waste currently going to these systems (utilized capacity). Available capacity was estimated as the difference between maximum and utilized capacity. For today's rule, EPA analyzed commercial capacity for hazardous waste combustion (including incineration and reuse as fuel), stabilization, vitrification, and several metal recovery technologies.

1.3 SUMMARY OF CAPACITY ANALYSIS

Exhibit 1-2 indicates the total quantities of surface disposed wastes that may require alternative commercial treatment capacity as a result of the Phase IV rule, whether treatment capacity is available for these wastes, and the national capacity variances being granted in today's rulemaking. National capacity variances begin on the date of publication of the Phase IV final rule in the Federal Register. EPA is granting a two-year national capacity variance for newly identified mixed RCRA/radioactive wastes, including soil and debris, for which standards are being promulgated in this rule. Also, EPA is granting a two-year national capacity variance for five large volume wastes generated from elemental phosphorous processing—Medusa Scrubber blowdown, furnace building washdown, NOSAP slurry, precipitator slurry, and phossy water. For TC metal wastes and the remaining newly identified mineral processing wastes, including soil and debris, the Agency has determined that adequate treatment capacity will exist at the time the Phase IV rule becomes effective and, therefore, is not granting a national capacity variance for these wastes (beyond the 90 days allowed prior to the effective date of the rule).

1.4 ORGANIZATION OF BACKGROUND DOCUMENT SUPPORTING THE CAPACITY ANALYSIS

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

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

- **Chapter 2: Available Treatment Capacity.** Describes the methodology and data used to determine available capacity for combustion, stabilization, vitrification, and metals recovery.

- **Chapter 3: Capacity Analysis for Newly Identified Toxicity Characteristic Metal Wastes.** Describes the methodology and data used to conduct the capacity analysis for toxicity characteristic metal wastes (D004-D011).

- **Chapter 4: Capacity Analysis for the Newly Identified Mineral Processing Wastes.** Discusses the methodology and data used to conduct the capacity analysis for the newly identified mineral processing wastes.

EXHIBIT 1-2
SUMMARY OF CAPACITY ANALYSIS AND VARIANCE DECISIONS

Waste Type[a]	Quantities Requiring Alternative Capacity (mt/year)	Adequate Alternative Capacity Currently Available? (Yes/No)	National Capacity Variance[c]
Newly Identified Mineral Processing Wastes from Elemental Phosphorus Processing	1 million	No	Two Years
Other Newly Identified Mineral Processing Wastes (Including Soil and Debris)	<< 1.9 million	Yes	90 Days
Newly Identified TC Metal Wastes (Including Soil and Debris)	<< 1.2 million	Yes	90 Days
Newly Identified Mixed RCRA/Radioactive Wastes (Including Soil and Debris)	Unknown[b]	No	Two Years

[a] Only newly identified wastes (e.g., TC metal wastes that pass the EP) are eligible for a variance. Other wastes may be affected by this rule, but are not eligible for a variance, or are subject to a previously promulgated variance (i.e., newly listed wood preserving wastes from the "Mini" Phase IV rule).

[b] Significant uncertainty exists concerning the volume of these wastes affected by today's rulemaking. Despite this uncertainty, however, EPA has determined that no alternative treatment capacity is available.

[c] National capacity variances begin on the date of publication of the Phase IV final rule in the Federal Register.

CHAPTER 2
AVAILABLE TREATMENT CAPACITY

This chapter presents EPA's estimates of available commercial treatment capacity for selected treatment technologies applicable to TC metal wastes, mineral processing wastes, and other mixed radioactive wastes affected by the Phase IV LDR rule. This information is used in subsequent chapters for evaluating the availability of capacity for treatment/recovery technologies as alternatives to land disposal of the newly identified hazardous wastes and making treatment capacity variance determinations for LDR wastes.

The assessment of national available commercial treatment capacity presented in this chapter focuses on the following four types of treatment technologies: (1) stabilization, (2) metals recovery, (3) combustion, and (4) vitrification. These four technologies were selected because they are commonly used by the hazardous waste management industry for the treatment of nonwastewater forms[1] of newly identified hazardous wastes (based on the waste volumes treated); they are designated as best demonstrated available technologies (BDATs) for LDR wastes (e.g., incineration for organics, stabilization and high temperature metals recovery (HTMR) for TC metals); and/or they have been identified as effective treatment technologies for certain unique wastes (e.g., vitrification for unique combinations of metals). This chapter also contains a discussion on the available treatment capacity for mixed RCRA/radioactive wastes; these wastes are discussed in a separate section because of their unique characteristics.

This chapter is organized into the following five sections:

- **Section 2.1: Stabilization Capacity;**
- **Section 2.2: Metals Recovery Capacity;**
- **Section 2.3: Combustion Capacity;**
- **Section 2.4: Vitrification Capacity; and**
- **Section 2.5: Mixed RCRA/Radioactive Waste Capacity.**

2.1 STABILIZATION CAPACITY

Stabilization is a conventional treatment technology that effectively treats wastes contaminated with metals and other inorganic contaminants. Thus, stabilization is a widely used commercial treatment technology for many of the wastes covered by the Phase IV LDR rule.

In the capacity analysis conducted for the Phase IV LDR second supplemental proposed rule (62 *FR* 26041, May 12, 1997), the Agency estimated approximately 1.1 million tons/year of stabilization capacity to be commercially available. To obtain this estimate, the Agency built, in part, on the capacity analysis

[1] Note that only nonwastewaters are examined in this analysis because, in 1996, following development of the first Phase IV LDR capacity analysis background document (see 60 *FR* 43654, August 22, 1995), the Land Disposal Program Flexibility Act (LDPFA) was signed into law. As described in more detail in Chapter 3 of this capacity analysis, LDPFA eliminated the need for alternative wastewater treatment capacity resulting from the Phase IV rule. Therefore, the section on wastewater treatment capacity that existed in prior versions of this background document has been removed from this chapter.

conducted for the Third Third LDR Rule (55 *FR* 22520, June 1, 1990). The Third Third analysis was based on the May 1990 Treatment, Storage, Disposal, and Recycling (TSDR) Capacity Data Set (based on a survey of TSDR facilities). The TSDR data set contains estimates of the amount of hazardous and nonhazardous waste entering each treatment system in 1986, the maximum hazardous waste capacity, and the maximum total waste capacity. 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 practices at RCRA-permitted and interim status treatment, storage, recycling, and disposal facilities. The TSDR Survey also contained projections of capacity changes from 1986 through 1992.[2]

Following the original TSDR Survey, EPA updated the TSDR Capacity Data Set for critical technologies based on confirmation of planned capacity changes, and other information received since the survey (e.g., comments on proposed rules). This updated information was used to account for the treatment capacity required for wastes covered by previous LDR rules and then estimate the stabilization capacity available (approximately 1.1 million tons/yr) for wastes covered by the Phase IV LDR rule.

EPA provided these estimates for public comment as part of the Phase IV LDR second supplemental proposed rule (62 *FR* 26041, May 12, 1997). In response, EPA obtained additional and more recent information on stabilization capacity from commenters. EPA also collected additional information from published data and surveys and the 1995 Biennial Reporting System (BRS) database. These data were used to build upon the 1.1 million tons/year of stabilization capacity estimate published by EPA in the Phase IV proposed rule. The methodology used for this analysis and the revised stabilization treatment capacity estimated for the Phase IV wastes are provided below.

For updating the stabilization treatment capacity estimate for the Phase IV final rule, EPA examined several new data sources. Of these, the 1995 BRS data provided the most substantive and current information on commercial stabilization facilities. EPA relied on information provided in the PS, WR, and GM forms[3] of the BRS and estimated the available capacity for individual facilities as follows:

- For 16 facilities, complete maximum and utilized treatment capacity data were available from PS forms;
- For nine facilities, the 1995 BRS data did not provide adequate capacity information, so EPA used information reported by these facilities in the 1993 BRS;
- For 12 facilities, EPA received maximum and utilized treatment capacity data through direct correspondence with facility representatives;[4]

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[2] For a more detailed explanation of the TSDR Survey and of the Third Third Rule, refer to USEPA, *Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions*, May 1990, Volumes I and II, in the docket for the Third Third rule.

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

[4] Direct communication with commercial treaters (see phone logs in Appendix A); Fax Transmittal Memo from Garry Metcalf, LWD, Inc., November 12, 1997 (see Appendix A); and Fax Transmittal Memo from Scott Kuhn, Laidlaw, December 12, 1997 (see Appendix A).

- Additional information on three facilities was received from contact with states (see Appendix A);

- For 24 facilities, EPA estimated the utilized capacity information based on the waste quantities reported in the WR and GM forms, and since maximum capacity information is not provided in the WR and GM forms, these capacities were calculated from the utilized capacity and the average industry utilization rate (14 percent)[5] calculated based on data from facilities that provided complete information.; and

- For one facility (City Environmental - MI) only maximum capacity value was available, and therefore the utilized capacity was estimated based on the average industry utilization rate of 14 percent.

The results of this analysis are provided in Exhibit 2-1. Facilities for which the average industry utilization rate was used to calculate the utilized capacity are indicated in bold/italics font in Exhibit 2-1. Based on this analysis, EPA estimates that as much as 18 million tons/year of stabilization capacity is currently available for wastes restricted from land disposal under the Phase IV rulemaking. This estimate reflects a significant increase from the estimate of 1.1 million tons/year in the capacity analysis for the Phase IV LDR second supplemental proposed rule (62 *FR* 26041, May 12, 1997). This increase in available capacity is attributed to the use of more complete, accurate, and current commercial treatment data.

Several caveats should be noted regarding these data:

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

- For many facilities identified from the BRS database, the commercial availability of the treatment is limited, none, or unknown. Therefore, available commercial capacity could be lower than what is shown in Exhibit 2-1. On the other hand, most facilities that report commercial status report fully available commercial status (code 4). These facilities alone account for approximately 8 million tons/year of available capacity. Furthermore, the one facility reporting full non-commercial status (code 1) was one of the smaller facilities.

[5] An average industry utilization rate of approximately 14 percent (1,864,805/13,716,092 = 0.136) was calculated based on the volumes of waste being treated at the 34 facilities that submitted PS forms to the BRS or provided capacity information through direct correspondence with EPA (see Exhibit 2-1).

EXHIBIT 2-1
STABILIZATION CAPACITY

Facility Name	EPA ID	Maximum Capacity (t/y)	Utilized Capacity (t/y)	Available Capacity (t/y)	Commercial Capacity Availability Code	Data Source
American Brass & Iron Foundry	CAD021774559	***2,008***	273	***1,735***	NA	1
Appropriate Technologies 11, Inc. (APTEC)	CAT080010101	***29***	4	***25***	NA	1
Burlington Environmental, Inc - George	WAD000812909	***2***	0	***2***	NA	4
Burlington Environmental, Inc - Kent	WAD991281767	***11,831***	1,609	***10,222***	NA	4
Burlington Environmental, Inc - Tacoma	WAD020257945	***6,979***	949	***6,030***	NA	4
Burlington Environmental, Inc.	WAD092300250	***1,929***	262	***1,667***	NA	4
Chemical Waste Management	LAD000777201	***507,555***	69,006	***438,549***	NA	3
Chemical Waste Management	IND078911146	***576,469***	78,375	***498,094***	NA	4
Chemical Waste Management Inc	ALD000622464	1,081,402	54,186	1,027,216	4	3
Chemical Waste Management of the Northwest	ORD089452353	***1,010***	137	***872***	4	4
Chem-Met Services Incorporated	MID096963194	73,502	19,960	53,542	NA	1
City Environmental, Inc	MID054683479	2,520,000	63,418	2,456,582	4	3
City Environmental, Inc.	MID980991566	4,200,000	***571,021***	3,628,979	NA	3
Claude Profitt - Hazardous Waste Site	WVP000006106	2,700	1,300	1,400	NA	3
Clean Harbors of Baltimore	MDD980555189	***196***	27	***170***	NA	4
Clean Harbors of Braintree, Inc.	MAD053452637	36,500	1,074	35,426	4	3
Clean Harbors of Connecticut, Inc.	CTD000604488	51,480	2,496	48,984	4	3
Clean Harbors of Natick	MAD980523203	***18***	2	***15***	NA	4
CP Chemicals Inc.	NJD002141950	***353***	48	***305***	NA	4
CWM / CID Recycling & Disposal FAC	ILD010284248	67,200	2,843	64,357	NA	1
CWM Chemical Services, Inc.	NYD049836679	106,392	89,578	16,814	4	3
CWM Resource Management Inc./ OHM	GAD096629282	132,919	423	132,496	NA	1
Dynecol Incorporated	MID074259565	224,648	27,243	197,405	NA	1
East Coast Environmental Services	CTD089631956	5,000	22	4,978	NA	1
Ecolotec Incorporated	OHD980700942	***24,189***	3,289	***20,901***	NA	4
Envirite Corporation	PAD010154045	50,000	9,500	40,500	4	3,7
Envirite Corporation	OHD980568992	75,000	41,056	33,944	NA	1
Envirocare of Utah	UTD982598898	***6,499***	884	***5,615***	NA	4

EXHIBIT 2-1 (continued)
STABILIZATION CAPACITY

Facility Name	EPA ID	Maximum Capacity (t/y)	Utilized Capacity (t/y)	Available Capacity (t/y)	Commercial Capacity Availability Code	Data Source
Environmental Enterprises Inc.	OHD083377010	***15,779***	2,145	***13,634***	NA	4
Environmental Quality Inc, Detroit MI (Michigan Disposal)	MID000724831	405,000	300,000	105,000	NA	2
Environmental Technologies, Inc. King of Prussia PA	NA	70,000	70,000	0	NA	2
Environmental Waste Resources	CTD072138969	40,000	1,098	38,902	4	3
Envirosafe Services of Idaho	IDD073114654	110,000	70,000	40,000	4	2
Envirosafe Services of Ohio	OHD045243706	365,000	345,000	20,000	4	2
Gibson Environmental	CAD980883177	1,752,000	47,231	1,704,769	NA	1
GNI (Disposal Systems) Deer Park, TX	TXD000719518	1,159,000	335,400	823,600	NA	2
Heritage Environmental Services	IND093219012	350,000	21,970	328,031	4	3
Laidlaw Environmental Services	CAD980675276	340,000	16,000	324,000	4	6
Laidlaw Environmental Services	CAD000633164	340,000	16,000	324,000	4	6
Laidlaw Environmental Services (UPSCI) Clive, UT	UTD982595795	132,000	30,000	102,000	NA	6
Laidlaw Environmental Services, Waynoka (USPCI, Lone Mt.)	OKD065438376	200,000	60,000	140,000	4	6
LWD Sanitary Landfill, Inc.	KYD985073196	146,000	14,600	131,400	3	5
Magma Metals	AZD001886597	1,689,600	40	1,689,560	NA	3
Mill Service Inc. Yukon, PA	PAD004835146	230,880	37,434	193,446	4	2,7
Northwest Enviroservice Inc	WAD058367152	***1,458***	198	***1,260***	NA	4
Peoria Disposal Company, Inc. (PDC)	ILD000805812	1,167,640	45,527	1,122,113	4	3
Perma-fix treatment Services Inc	OKD000402396	***1,162***	158	***1,004***	NA	4
Republic Environmental Systems	PAD085690592	109,000	9,660	99,340	4	3,7
Republic Environmental Systems	OHD055522429	***168,353***	22,889	***145,464***	NA	4
Rho Chem Facility	CAD008364432	***384***	52	***331***	NA	4
Rollins Environmental Services	LAD010395127	***19,652***	2,672	***16,980***	1	4
Rollins Environmental Services	TXD055141378	***549,825***	74,753	***475,072***	NA	4
Rollins Envl. Services / Highway 36 Land Dvpmt Corp.	COD991300484	200,000	112,000	88,000	NA	2
Rollins OPC Inc	CAD050806850	***1,086***	148	***938***	NA	4
Solvent Service Co. Inc.	CAD059494310	***2***	0	***1***	NA	4

EXHIBIT 2-1 (continued)
STABILIZATION CAPACITY

Facility Name	EPA ID	Maximum Capacity (t/y)	Utilized Capacity (t/y)	Available Capacity (t/y)	Commercial Capacity Availability Code	Data Source
Spring Grove Resource Recovery Inc.	OHD000816629	15,230	3,095	12,134	4	3
Texas Ecologists	TXD069452340	***84,486***	11,487	***73,000***	NA	4
Tri-state Steel Drum Inc.	GAD033842543	***1,129***	154	***976***	NA	4
U.S. Ecology, Inc.	NVT330010000	***1,399,568***	190,282	***1,209,287***	4	4
USPCI Grassy Mountain Facility	UTD991301748	468,000	16,651	451,349	4	3
Zecco, Inc.	MAD052924495	***6***	1	***5***	NA	4
TOTAL		**21,298,049**	**2,895,628**	**18,402,421**		

NOTES:

Capacity values estimated using the average industry utilization rate are shown in bold/italics font; see text on page 2-3.

N/A = Not Available

Commercial Capacity Availability Codes:
1. Available only for management of hazardous waste generated on site
2. Available only to generators or facilities owned by the same company or organization
3. Available to a limited group of generators or facilities for commercial hazardous waste management
4. Available to any generators or facilities for commercial hazardous waste management

Data Source Codes:
1. 1993 BRS Database
2. Direct communication with commercial treaters; see phone logs in Appendix A
3. 1995 BRS Database - PS Form
4. 1995 BRS Database - WR and GM Forms
5. Fax Transmittal Memo from Garry Metcalf, LWD, Inc., November 12, 1997 (see Appendix A)
6. Fax Transmittal Memo from Scott Kuhn, Laidlaw, December 12, 1997 (see Appendix A)
7. Memo from Robert Finkel, Pennsylvania Department of Environmental Protection (see Appendix A)

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

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

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

- Another caveat is the ability of the treatment to meet UTS, give any technical limitations. Thus available capacity could be less than estimated based on this issue.

To address some of the above concerns and to obtain information on other aspects of stabilization (e.g., the amount of time needed to optimize a system to meet the UTS), the Agency conducted follow-up discussions with several commercial treaters and organizations that submitted comments to the various Phase IV LDR proposed rules (see Appendix A). The results have been incorporated into Exhibit 2-1 to the extent possible. Overall, commenters indicated widespread use of stabilization for characteristic metal wastes. All commenters who provided information on available capacity indicated that they are not utilizing their treatment units to the maximum practical capacity. Commercial treaters also indicated that stabilization can be readily optimized in most cases to treat Phase IV wastes to the UTS levels. Several commercial treaters (Chemical Waste Management (CWM-LA, CWM-IL, Environmental Quality, Environmental Technologies, EnviroSafe, GNI, Laidlaw, LWD, Inc., Mill Service-Yukon, and Rollins-CO) commented that no modifications would need to be made to their treatment processes or that minimal time is required for very minor modifications. Two commercial treaters (LWD, Inc. and Laidlaw) provided relatively detailed estimates of the time needed to make modifications to stabilization treatment systems in order to meet the UTS levels (see Appendix A). According to the treaters, the amount of time needed, which includes time for waste characterization, process determination, bench-scale tests, and the actual modification of the stabilization system, is 90 days or less. Only two out of twelve treaters providing such information (Environmental Enterprises and Heritage Environmental Services)—which also were among the smaller of the twelve facilities— indicated that it may take several years to meet treatment standards, primarily due to changes needed in their permits, although the time needed to change treatment processes would not be great.

As discussed in Chapters 3 and 4, large quantity remediation sites often treat on site for economic reasons. Mobile treatment is preferred in these cases. One industry representative described at least seven sites that use mobile commercial excavation and stabilization.[6] These data indicate that these wastes usually are sent to Subtitle D landfills after treatment or are capped in place. Based on discussions with treaters, the Agency determined that mobile stabilization is commercially available to treat both the previously regulated and the new de-Bevilled mineral processing and TC metal wastes (Appendix A). Several commercial

[6] Summary of Minutes of April 30, 1996 Meeting of EPA and Representatives of Lead Recovery from Batteries (See Appendix A).

facilities have indicated that, similar to stabilization conducted at the commercial treaters' facilities, mobile technology could be made readily available (i.e., in a matter of weeks to months). The literature also indicates that numerous commercial vendors also are available to provide on-site stabilization.[7]

Some waste streams were identified by commercial waste managers as being relatively difficult to treat using stabilization. Three facilities (Environmental Enterprises, Heritage Environmental Services, and Peoria Disposal Company) noted, for example, that treating organic UHCs would require some type of pretreatment. Two of these facilities (Environmental Enterprises and Heritage Environmental Services) stated that they would incinerate these wastes, and the other facility (Peoria Disposal Company) stated that it would send the wastes off site for pretreatment. The Agency received several other comments, however, indicating that these difficulties could be readily overcome. Two commenters (Environmental Quality and LWD, Inc.) specifically stated that organic UHCs in the wastes that they receive can be readily treated to UTS without significant changes in their processes.

Finally, the Agency's literature review indicates that stabilization processes have been widely used and are considered a reliable and readily available treatment technology for many metal-contaminated wastes. For example, one source describes their extensive database of treatment reactions for metal-contaminated wastes in the U.S.[8] Furthermore, this source indicates that for a related type of treatment—chemical fixation—more than 700 waste streams have been evaluated and successfully treated in the U.S.; more than 400 waste streams have been treated successfully in bench-scale testing; and more than 100 waste streams have been treated in field applications.

The Agency has received no comments on expected trends in the availability of stabilization capacity in the near term. Nevertheless, given the apparent increase in capacity indicated by this analysis, EPA expects that the availability of stabilization will at least remain steady or possibly increase during the next few years.

2.2 METALS RECOVERY CAPACITY

Due to several factors—including (1) metal recovery treatment as one of the bases for the LDR treatment standards, (2) the basic nature of mineral processing and many TC metal industries, and (3) EPA's policy of preferring pollution prevention or recycling to treatment—EPA evaluated the potential to recover metals from TC metal and newly identified mineral processing wastes.

As with stabilization capacity in Section 2.1, EPA has updated the available metals recovery capacity data significantly from the data presented in the Phase IV second supplemental proposed rule (62 *FR* 26041, May 12, 1997). Capacity for only a selected number of sites was presented at that time. For updating the metals recovery capacity estimate for this Phase IV final rule, EPA examined several new data sources. Of

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[7] The following is just a small sample of commercial vendors providing on-site commercial stabilization treatment identified from the literature: American Colloid Co.; Chemical Waste Management; Envirosource CSI; Erosion Control; Plastic Filter Company; Limestone Products Corp; Reinco, Inc.; and Stevenson Environmental Services. See Appendix A for additional vendors and facilities.

[8] Indelicato, Gregory and Gary Tipton, "Chemical Fixation Increase Options for Hazardous Waste Treatment," *Environmental Solutions*, May 1996.

these, the 1995 BRS data provided the most substantive and current information on commercial metals recovery facilities. EPA estimated the available capacity for individual facilities as follows:

- BRS data was collected from the PS, WR, and GM forms[9] for 72 facilities associated with five system codes: M011 - high temperature metals recovery; M012 - retorting; M013 - secondary smelting; M014 - other metals recovery for reuse; and M019 - metals recovery, type unknown.

- Maximum and utilized capacity data were obtained from PS forms for the eight facilities where the utilized capacity from the PS form was greater than the combination of the utilized capacities from the WR and GM forms.

- For the remaining 64 facilities, EPA estimated the utilized capacity information based on the waste volumes reported in the WR and GM forms. It was assumed that these facilities with unknown maximum capacity were utilized at the average industry rate of 39% (similar to the adjustment for stabilization facilities; see Section 2.1). This industry average was derived from the eight facilities that submitted complete capacity information in PS forms. The available capacity then was calculated by subtracting the utilized capacity from the maximum capacity.

The results of this analysis are provided in Exhibit 2-2. Facilities for which the average industry utilization rate was used to calculate the utilized capacity are indicated in bold/italics font in Exhibit 2-2. Based on this analysis, EPA estimates that as much as 2.2 million tons/year of metals recovery capacity is available for wastes restricted from land disposal under the Phase IV rulemaking.

Several caveats should be noted regarding these data:

- For many facilities identified from the BRS database, the commercial availability of the treatment is limited, none, or unknown. Therefore, available commercial capacity could be lower than what is shown in Exhibit 2-2. Most facilities that report commercial status report partial or fully available commercial status (codes 3 or 4). The fully commercial facilities alone account for approximately 900,000 tons/year of available capacity.

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

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

EXHIBIT 2-2
METALS RECOVERY CAPACITY

Facility Name	EPA ID	Maximum Capacity (t/y)	Utilized Capacity (t/y)	Available Capacity (t/y)	Commercial Capacity Availability Code	Data Source
21st Century EMI DBA Transporter	NVD980895338	***48***	19	***29***	NA	2
21st Century Envr Mgmt Inc of RI	RID980906986	***144***	57	***88***	1	2
Advanced Chemical Company	RID059735761	***733***	288	***445***	1	2
AERC	PAD987367216	***4,119***	1,618	***2,501***	NA	2
Allied Precious Metals	AZT050010685	***22***	9	***14***	1	2
Alpha Omega Recycling, Inc.	TXD981514383	***6,180***	2,427	***3,753***	NA	2
Amax Metals Recovery, Inc.	LAD058472721	***14,632***	5,747	***8,885***	NA	2
AT&T Nassau Metals	NYD086225596	***44***	17	***26***	3	2
Bay Zinc Company Inc	WAD027530526	***15,172***	5,959	***9,213***	NA	2
Bethlehem Apparatus Co Inc	PAD002390961	***1,508***	592	***916***	4	2
Boliden Metech Inc	RID063890214	***1,010***	397	***614***	4	2
Burlington Environmental Inc - Kent	WAD991281767	***15***	6	***9***	NA	2
Chemtron Corp.	OHD066060609	8	4	4	4	1
Clean Harbors of Braintree, Inc	MAD053452637	***32***	13	***19***	NA	2
Clean Harbors of Natick, Inc	MAD980523203	***18***	7	***11***	NA	2
CP Chemicals Inc	NJD002141950	***467***	184	***284***	NA	2
Cyano Corporation of Michigan Inc.	MID985567114	750	193	557	4	1
Dayton Water Systems	OHD061614673	***147***	58	***89***	3	2
Doe Run Co Buick Smelter	MOD059200089	***2,894***	1,137	***1,757***	NA	2
E.I. Dupont De Nemours & Company	TXD008079642	***3***	1	***2***	NA	2
Encycle/texas, Inc.	TXD008117186	***77,635***	30,492	***47,142***	NA	2
Engelhard West, Inc.	CAT000612150	***286***	112	***173***	3	2
Energy System & Services	MOP000001768	***40***	16	***24***	NA	2
Enviro Chem Inc.	MND980996805	***8***	3	***5***	NA	2
Environmental Waste Resources	CTD072138969	***0***	0	***0***	NA	2
Gannon & Scott Inc	RID981886104	***104***	41	***63***	4	2
General Battery Corp Reading Complex	PAD990753089	190,000	9,501	180,499	4	1
General Battery/exide Corp.	IND000717959	***130,056***	51,082	***78,974***	3	2
GNB Battery Technologies	CAD097854541	***47,742***	18,751	***28,990***	3	2

EXHIBIT 2-2 (continued)
METALS RECOVERY CAPACITY

Facility Name	EPA ID	Maximum Capacity (t/y)	Utilized Capacity (t/y)	Available Capacity (t/y)	Commercial Capacity Availability Code	Data Source
GNB Technologies Inc	GAD070330576	***3,734***	1,467	***2,267***	3	2
GNB Technologies, Inc.	TXD006451090	***25,845***	10,151	***15,694***	NA	2
Gopher Resource Corporation	MND006148092	***164,049***	64,433	***99,616***	4	2
Grand Forks Air Force Base ND	ND3571924759	***3***	1	***2***	NA	2
Handy & Harman Refining Group	ILD000675249	***808***	317	***490***	4	2
Horsehead Resource Dvlpt Palmerton	PAD002395887	300,000	270,000	30,000	4	1
Hydromet Env'l Inc/ Recontek Inc.	ILD984766279	***3,299***	1,296	***2,003***	4	2
Inco Alloys International, Inc	WVD076826015	***940***	369	***571***	NA	2
INMETCO Inc	PAD087561015	90,559	69,659	20,900	4	1
J & B Enterprises	CAD069138899	***988***	388	***600***	4	2
Johnson Matthey Inc	NJD980755367	***1,406***	552	***854***	NA	2
Kaiser Biomedical Engineering	CAD983600339	***1,356***	533	***823***	2	2
Kinsbursky Brothers Supply Inc	CAD088504881	***23,426***	9,201	***14,225***	NA	2
Lamp Recyclers of Louisiana, Inc	LA0000365668	***411***	161	***249***	4	2
LEA Ronal Inc	NYD001325661	***109***	43	***66***	3	2
Mercury Refining Company, Inc.	NYD048148175	***957***	376	***581***	4	2
Micro Metallics Corp	CAD069124717	313,470	69	313,401	4	1
OSRAM Sylvania Inc Warren	PAD980554570	***113***	44	***69***	NA	2
Parkans International, Inc.	TXD008105959	***670***	263	***407***	NA	2
Phibro-tech, Inc.	CAD008488025	***100,136***	39,330	***60,806***	NA	2
Phibro-tech, Inc.	TXD047823265	***15,739***	6,182	***9,557***	NA	2
QUEMETCO Inc	CAD066233966	***1,262,404***	495,831	***766,573***	3	2
QUEMETCO, Inc.	IND000199653	***338,933***	133,122	***205,811***	4	2
Recovery & Reclamation, Inc.	TXD988077640	***835***	328	***507***	NA	2
Recyclights, Inc.	FL0000207449	***426***	167	***259***	4	2
Recyclights, Inc.	MN0000903468	6,521	1,516	5,005	4	1
Refined Metals Corporation	IND000718130	***4,120***	1,618	***2,502***	NA	2
Revere Smelting & Refining Corporation	NYD030485288	***168,319***	66,110	***102,209***	3	2

EXHIBIT 2-2 (continued)
METALS RECOVERY CAPACITY

Facility Name	EPA ID	Maximum Capacity (t/y)	Utilized Capacity (t/y)	Available Capacity (t/y)	Commercial Capacity Availability Code	Data Source
RFE Industries Inc	NJD055090815	***839***	330	***510***	NA	2
Safety-kleen Corp	MAD982755639	***4,103***	1,611	***2,491***	NA	2
Safety-kleen Corp.	TXD077603371	***5,058***	1,986	***3,071***	NA	2
Safety-kleen Corp. (Drew Resource Corp)	CAD070148432	11,657	7,640	4,017	4	1
Sanders Lead Company, Inc.	ALD046481032	***242,115***	95,095	***147,020***	3	2
Schylkill Metals Corporation	LAD008184137	***54,803***	21,525	***33,278***	1	2
Southdown Environmental Systems	TXD046844700	***3***	1	***2***	NA	2
Spring Grove Resource Recovery Inc	OHD000816629	***2***	1	***1***	NA	2
Technic Inc	RID001200252	***212***	83	***129***	3	2
The Upjohn Company	MID000820381	***13***	5	***8***	NA	2
U.S. Filter Recovery Services, Inc	MND981098478	***20,214***	7,939	***12,274***	NA	2
United Refining & Smelting co	ILD005087630	***530***	208	***322***	NA	2
UOP Shreveport Plant	LAD057109449	***1,631***	641	***990***	NA	2
X-RAY Unlimited, Inc.	LAD981513021	***591***	232	***359***	NA	2
ZIA Technology of Texas, Inc.	TXD987995941	***3,480***	1,367	***2,113***	NA	2
TOTALS:		**3,668,643**	**1,440,921**	**2,227,720**		

NOTES :

Capacity values estimated using the average industry utilization rate are shown in bold/italics font; see text on page 2-9.
N/A = Not Available

Commercial Capacity Availability Codes:
1. Available only for management of hazardous waste generated on site
2. Available only to generators or facilities owned by the same company or organization
3. Available to a limited group of generators or facilities for commercial hazardous waste management
4. Available to any generators or facilities for commercial hazardous waste management

Data Source Codes:
1. 1995 BRS PS Forms -- 2. 1995 BRS WR and GM Forms

- The average utilization rate of 39 percent that was used to calculate the maximum and available capacity for many facilities may not provide an accurate statistical representation of the national average.

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

- Another caveat is the ability of the treatment to meet UTS, give any technical limitations. Thus available capacity could be less than estimated based on this issue.

In addition to the data analysis, the Agency conducted follow-up discussions with several commercial treaters who submitted comments to the various Phase IV LDR proposed rules. These commenters indicated that capacity exists at their facilities to treat most Phase IV wastes to the proposed treatment standards (see Appendix B).

EPA did not receive any comments on expected trends in the availability of metals recovery capacity in the near term. Nevertheless, the Agency expects the demand and availability for metals recovery technologies will increase in the future because of the increasing costs of primary metals production. When coupled with the expected continuing emergence of new and cost-effective metals recovery technologies, the availability for metals recovery to remain at a steady state during the next few years seems likely.

2.3 COMBUSTION CAPACITY

EPA has identified combustion as the BDAT for rendering many organic constituents non-hazardous. In assessing the available treatment capacity for combustion, EPA compiled data for hazardous waste incinerators, which have the sole purpose of destroying hazardous wastes, and for boilers and industrial furnaces (BIFs), which have the dual purpose of destroying hazardous wastes and deriving energy from the waste that can be then used for other industrial processes.

In analyzing alternative treatment capacity for combustion for this final rule, the Agency significantly updated the data from the second supplemental proposed rule (62 *FR* 26041, May 12, 1997). For this update, EPA used as a baseline the results of the capacity analysis conducted for the Phase II rule (59 *FR* 47982, September 19, 1994) because it was the last capacity analysis based on a significant update, i.e., information received from facilities participating in the Hazardous Waste Treatment Council (HWTC) and Cement Kiln Recycling Coalition (CKRC) surveys conducted in 1993. The results of the Phase II available capacity analysis for combustion are presented in Exhibit 2-3.

To obtain more recent data on the status of commercial combustion facilities, EPA collected information from public comments, recently published data, and the 1995 BRS database. These data, as applicable, are incorporated in the available capacity analysis discussed in this section.

EXHIBIT 2-3
ORIGINAL (1994) BASELINE FOR AVAILABLE COMBUSTION CAPACITY

Waste Form	Incinerators			BIFs			Total Available
	Maximum (1,000 tpy)	Available (1,000 tpy)	Percent Utilized	Maximum (1,000 tpy)	Available (1,000 tpy)	Percent Utilized	(1,000 tpy)
Compressed gases	63	61	3	NA	NA	NA	61
Total liquids and pumpable sludges	798	471	41	1,815	777	57	1,248
Total solids and non-pumpable sludges	532	313	41	290	194	33	507
Totals[a]	**1,393**	**845**	**39**	**2,104**	**971**	**54**	**1,816**

[a] Numbers may not sum due to rounding.

Source: USEPA, *Background Document for Capacity Analysis for Land Disposal Restrictions Phase II - Universal Treatment Standards, and Treatment Standards for Organic Toxicity Characteristic Wastes and Other Newly Listed Wastes (Final Rule)*, August 1994.

Because combustion capacity has historically been limited for non-pumpable sludges and solids, and because wastewaters are not a capacity issue for this rule (see the introduction to this chapter), EPA categorized the available information on combustion treatment capacity into three categories: (1) compressed gases, (2) liquids and pumpable sludges, and (3) solids and non-pumpable sludges.

To categorize the data into these three waste forms, EPA calculated average industry proportions of waste forms from the original 1994 baseline data and multiplied these proportions by maximum and available totals obtained from the literature.[10] For example, in the original 1994 baseline the maximum incineration capacity for liquids and pumpable sludges was 798,000 tons out of a total of 1,393,000 tons (or 57 percent). It was thus assumed that 57 percent of current estimates of maximum and available capacity of all incinerators was used to treat liquids and pumpable sludges at each individual facility.

The updated baseline data shown in Exhibit 2-4 reflect openings and closures of several incinerators and BIFs. According to the 1994 baseline data, there were 16 incinerators that commercially managed hazardous wastes. However, since then one of these incinerators (Rhone Poulenc's Indiana facility) has been classified as a BIF. In addition, six additional incinerators have been included in this updated baseline analysis (Allied-Signal Inc., Clean Harbors Technologies, ICI Explosives Environmental Company, Laidlaw/BDT, Waste Research and Reclamation, and Waste Technologies Industries). Despite the addition of these new facilities, the available capacity for hazardous waste incineration has decreased from 845,000 tons per year in 1994 to 405,500 tons per year in the updated 1997 baseline.

According to the original baseline data, 30 BIFs were commercially managing hazardous wastes in 1994. Newly obtained data indicate that four of these BIFs (Citadel Cement, Dixie Cement, North Texas Cement, and Southwestern Portland Cement) are no longer accepting hazardous wastes commercially. Also, two facilities (Rhone Poulenc's Indiana facility and Systech's Alabama facility) were newly identified as BIFs. Five other facilities identified in the newly obtained data were determined to be closed. The available capacity for BIFs decreased from 971,000 tons per year in 1994 to 574,000 tons per year in 1997.

In addition to fixed-base incinerators, the available treatment capacity for mobile incinerators was analyzed. The analysis for mobile incinerators was based on different data than that used for fixed-based incinerators and BIFs. Data from Superfund Records of Decision (RODs) indicate that, between 1986 and 1988, the number of Superfund sites requiring mobile incineration as a cleanup technology rose from 6 to 17. However, this growth did not continue in the following years. Between 1990 and 1993, EPA awarded only 13 Superfund contracts for mobile incineration. Because of this slow growth, several vendors who once operated mobile incineration units went out of business. According to one source, in 1996 the hazardous waste mobile incineration industry consisted of seven vendors operating 15 mobile incineration units at a total capacity of 2.176 million tons/year.[11]

[10] *EI Digest*, "Hazardous Waste Incinerators 1997," 1997, Number 5, page 7; *EI Digest*, "Industrial Furnaces," 1997, Number 7, page 12.

[11] *EI Digest*, "Mobile Thermal Treatment," January 1996, page 34.

EXHIBIT 2-4
UPDATED (1997) BASELINE FOR AVAILABLE COMBUSTION CAPACITY

Waste Form	Fixed-Base Incinerators			Mobile Incinerators			BIFs			Total Available Capacity
	Maximum (1,000 tpy)	Available (1,000 tpy)	Percent Utilized	Maximum (1,000 tpy)	Available (1,000 tpy)	Percent Utilized	Maximum (1,000 tpy)	Available (1,000 tpy)	Percent Utilized	(1,000 tpy)
Updated Baseline Without Deductions										
Compressed gases	49	19	38%	NAV	NAV	NAV	NAP	NAP	NAP	19
Liquids and pumpable sludges	614	265	43%	NAV	NAV	NAV	1,307	471	36%	736
Solids and non-pumpable sludges	410	157	38%	NAV	NAV	NAV	287	103	36%	260
Total	1,073	441	41%	2,176	0	100%	1,684	574	34%	1,015
Required Capacity for Phase IV Wood Preserving Wastes										
Liquids and pumpable sludges	NAP	26	NAP	NAP	0	NAP	NAP	0	NAP	26
Solids and non-pumpable sludges	NAP	9	NAP	NAP	0	NAP	NAP	0	NAP	9
Available Capacity Values Including Deduction of Required Capacity for Phase IV Wood Preserving Wastes										
Compressed gases	49	19	38%	NAV	NAV	NAV	NAP	NAP	NAP	19
Liquids and pumpable sludges	614	239	39%	NAV	NAV	NAV	1,307	471	36%	710
Solids and non-pumpable sludges	410	148	38%	NAV	NAV	NAV	287	103	36%	251
Total Updated Baseline	**1,073**	**406**	**38%**	**2,176**	**0**	**100%**	**1,684**	**574**	**34%**	**980**

NAP: Not Applicable
NAV: Not Available

Facility specific information was not available for publication.

The above sector-specific and waste-form specific totals were developed from the following data sources:

- *EI Digest*, "Hazardous Waste Incinerators 1997," 1997, Number 5, page 7;
- *EI Digest*, "Industrial Furnaces," 1997, Number 7, page 12;
- *EI Digest*, "Mobile Thermal Treatment 1996," January 1996; page 34; and
- USEPA, *Background Document for Capacity Analysis for Land Disposal Restrictions Phase II - Universal Treatment Standards, and Treatment Standards for Organic Toxicity Characteristic Wastes and Other Newly Listed Wastes (Final Rule)*, August 1994.

Finally, the required capacity for the Phase IV Wood Preserving Wastes Final Rule was taken into account. To estimate the available combustion capacity for the remaining Phase IV wastes (TC metal and mineral processing wastes), EPA deducted the required capacity for wood preserving wastes from the updated baseline. As a result, the available combustion capacity for treating wastes that would be restricted from land disposal by today's rulemaking is approximately 980,000 tons/year (Exhibit 2-4).

The available combustion capacity estimates discussed above are expected to remain relatively steady through the year 2000. Although one munitions treatment facility is awaiting approval of its permit to burn military munitions and other explosives, no applications for new hazardous waste incinerators are immediately pending. Most of the proposals for new combustion capacity that have surfaced recently are for facilities that specialize in the combustion of military munitions, other explosive materials, or mixed radioactive wastes.[12] In addition, several facilities that had proposed expansion of thermal capacity have now abandoned their proposals.[13] Difficulties in permitting make it highly unlikely that other combustion units, such as mobile incineration units, could be brought on-line in the near-term (i.e., within two years). Recent industry publications indicate that the public continues to oppose nearly every proposed hazardous waste management facility, and state and local legislative bodies continue to pass restrictive siting laws or permitting moratoriums. As a result, many project sponsors have already, or may eventually, find the process too costly.[14]

2.4 VITRIFICATION CAPACITY

The Agency has determined that vitrification technology is commercially available for treating limited quantities of Phase IV wastes, such as some mixed metal wastes and high arsenic wastes, that are difficult to treat using stabilization. One commenter (Beazer East, Inc.) identified a commercial facility that operates a tested, full-scale vitrification process.[15] Using the ATTIC and VISITT databases,[16] EPA also identified a sample of companies conducting or selling supplies for vitrification.[17] The Agency subsequently held discussions with several facility representatives (see Appendix C). One company that EPA identified operates one vitrification system with an available capacity of 15,000 tons/year (13,500 mt/y) and is readily expandable to three systems for a total capacity of 45,000 tons/year. A full-scale, commercial unit (MSE)

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

[13] Aptus, Inc. (Rollins) of Coffeyville, Kansas; Holnam, Incorporated of Ada, Oklahoma; and Medusa Cement Company of Clinchfield, Georgia, as described in "Commercial Hazardous Waste Management Facilities: 1997 Survey of North America," *The Hazardous Waste Consultant.* March/April 1997. Not that the planned expansion by Aptus, Incorporated, would have added more capacity to the estimates discussed above.

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

[15] The commenter also notes, however, that the regulatory status of this facility (Marine Shale Processors (MSP)) remains in question.

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

[17] The following is a small sample of commercials vendors providing vitrification equipment or services: Geosafe Corp, Vortec Corp, Retech Inc., GTS of Duratech, and MSE.

treats approximately 2,000 tons/year (1,800 mt/yr). Bench-scale and pilot-scale systems for vitrification are known to have been underway at numerous other facilities in 1994.[18]

Notwithstanding this potentially available vitrification capacity, EPA realizes that available vitrification capacity likely is relatively low compared to other treatment technologies. Nevertheless, capacity is expected to change in the coming years as the technology improves and operations (e.g., fuel use) become more efficient. Furthermore, because EPA is setting numerical treatment standards for Phase IV, other treatment technologies capable of achieving the UTS limits are not prohibited from being used (except for those that may constitute impermissible dilution). For example, managers of lower concentration wastes may send the waste for stabilization or other treatment technologies.[19]

2.5 MIXED RCRA/RADIOACTIVE WASTE CAPACITY

Available commercial treatment capacity for mixed radioactive waste is discussed in detail in the capacity analysis background document for the original Phase IV proposed rule (60 *FR* 43654, August 22, 1995). Some minor updates were included in the Phase III final rule (61 *FR* 15565, April 8, 1996). As discussed in detail in those analyses, any commercial capacity that is available for mixed radioactive wastes must be used for mixed wastes that were regulated in previous LDR rulemakings and whose variances have already expired. EPA has not received any information indicating that this situation has changed and, in fact, has received numerous comments to the Phase IV proposed rules and notices that capacity for mixed radioactive wastes is still a significant problem. See the Comment Response Document for the comments on this issue.

[18] Attachment to memorandum from Bill Kline (U.S. EPA) to ICF Incorporated, March 17, 1994 (see Appendix C).

[19] For additional information on this issue, see Appendix C.

CHAPTER 3
CAPACITY ANALYSIS FOR TOXICITY CHARACTERISTIC METAL WASTES

This chapter presents EPA's capacity analysis for the TC metal wastes covered by the Phase IV LDR Rule. The chapter is organized into the following seven sections:

- **Section 3.1: Regulatory Background**, provides additional detail on the wastes addressed in this analysis;
- **Section 3.2: Data Sources**, describes the data sources used in the analysis;
- **Section 3.3: Waste Generation and Management**, describes TC metal waste generation and management;
- **Section 3.4: Soil Contaminated with Newly Identified TC Metal Wastes**, discusses the soil and debris contaminated with newly identified TC metal wastes;
- **Section 3.5: Mixed Radioactive TC Metal Wastes**, addresses mixed radioactive TC metal wastes;
- **Section 3.6: Capacity Analysis**, provides the capacity analysis; and
- **Section 3.7: Summary of Results**, summarizes the results of the capacity analysis.

3.1 REGULATORY BACKGROUND

On May 19, 1980 (45 *FR* 33084), the Agency promulgated the final rule on the use of the Extraction Procedure (EP) toxicity test to identify wastes that pose a hazard to human health and the environment due to their potential to leach significant concentrations of hazardous constituents. Eight metals (D004-D011) and six pesticide constituents (D012-D017) were identified, which if present in the EP waste extract in excess of specified concentrations caused the waste to be identified as hazardous. EPA determined the regulatory concentration levels by multiplying constituent-specific chronic toxicity levels (the National Interim Primary Drinking Waster Standards (DWS)) with a generic dilution/attenuation factor of 100, to reflect both the concentration at which the constituent is harmful to human health and the environment and the fate of the constituent in the environment.

On March 29, 1990 (55 *FR* 11798), the Agency, after several revisions to the existing hazardous waste identification regulations, finalized the Toxicity Characteristic (TC) rule. The TC rule replaced the EP leaching test with the Toxicity Characteristic Leaching Procedure (TCLP) and added 26 organic compounds to the list of TC constituents (D018-D043). A comprehensive list of the Federal Register notices related to the development of the TC regulations is provided in Exhibit 3-1.

Since the promulgation of the TC rule in 1990, the TCLP has been used to determine the toxicity characteristic of a metal waste. Wastes that are characteristic by the TCLP but not by the EP are considered newly identified wastes, which are currently not subject to the LDRs. Only these wastes are

EXHIBIT 3-1
LIST OF FEDERAL REGISTER NOTICES ADDRESSING
TOXICITY CHARACTERISTIC RULEMAKINGS

TC Issue	FR Notice	Date
Final Rule for Identification and Listing of Hazardous Waste: Use of EP Toxicity Test Procedure	45 *FR* 33084	May 19, 1980
Notice of Availability of Reports that Support the TCLP	51 *FR* 24856	July 9, 1986
Proposed Revisions to the Identification and Listing of Hazardous Waste: Use of the TCLP and Addition of Constituents to the Toxicity Characteristic	51 *FR* 21648	July 13, 1986
Final Land Disposal Restrictions Approach: Use of the TCLP for Compliance with Treatment Standards	51 *FR* 40572	November 7, 1986
Supplemental Notice of the Proposed Rulemaking: Consideration of Separate Wastewater TC	52 *FR* 18583	May 18, 1987
Notice of Data Availability (NODA) and Request for Comments: Supplemental to Proposed Rule: Use of a Generic DAF and Chronic Toxicity Reference Level Revisions	53 *FR* 18024	May 19, 1988
Proposed Revisions to TCLP to Replace Particle Reduction Step	53 *FR* 18792	May 24, 1988
Proposed Modifications to Groundwater Model	53 *FR* 28892	August 1, 1988
Identification and Listing of Hazardous Wastes: Toxicity Characteristic Revisions, Final Rule	55 *FR* 11798	March 29, 1990
Final Rule for Land Disposal Restrictions for Third Third Scheduled Wastes	55 *FR* 22520	June 1, 1990
Corrections to March 29, 1990 Toxicity Characteristic Revisions	55 *FR* 26986	June 29, 1990
ANPRM and Request for Comment and Data for the Approach for Establishing BDAT Treatment Standards for D004-D043	56 *FR* 55160	October 24, 1991
Land Disposal Restrictions—Phase II: Universal Treatment Standards for Organic TC Wastes and Newly Listed Wastes	59 *FR* 47982	September 19, 1994
Proposed Land Disposal Restrictions—Phase IV: Issues Associated with Clean Water Act Equivalency, and Treatment Standards for Wood Preserving Wastes and TC Metal Wastes	60 *FR* 43654	August 22, 1995
Notice of Data Availability (NODA): Land Disposal Restrictions Phase IV Proposed Rule—Issues Associated With Clean Water Act Treatment Equivalency, and Treatment Standards for Wood Preserving Wastes and Toxicity Characteristic Metal Wastes	61 *FR* 21418	May 10, 1996
Land Disposal Restrictions Phase IV: Second Supplemental Proposal on Treatment Standards for Metal Wastes and Mineral Processing Wastes, Mineral Processing and Bevill Exclusion Issues, and the Use of Hazardous Waste as Fill	62 *FR* 26041	May 12, 1997

eligible for a capacity variance under today's rulemaking. On August 22, 1995 (60 *FR* 43654), the Agency proposed revised LDR treatment standards for all characteristic metal wastes, including those previously regulated by the EP. These revised treatment standards, for both wastewater and nonwastewater forms of D004-D011 wastes, are numerically equivalent to the universal treatment standards (UTS). A universal treatment standard is a single treatment standard established for a specific constituent regardless of the waste matrix in which it is present (i.e., the same treatment standard applies to a particular constituent in each waste code in which it is regulated).[1]

EPA received several comments on the treatability of TC metal wastes to the UTS levels (e.g., see the Capacity Analysis Comment Summary and Response Document regarding today's rule). Upon additional review of the comments and data submitted by the commenters, the Agency re-proposed UTS levels for 12 metal constituents in the Phase IV LDR second supplemental proposed rule (62 *FR* 26041, May 12, 1997). In today's rule, EPA is promulgating the final UTS for those 12 metal constituents in TC metal wastes, requiring the UTS to be met for all underlying hazardous constituents (UHCs), and making national capacity variance determinations.

In 1996, the Land Disposal Program Flexibility Act (LDPFA) was signed into law. LDPFA provides an exemption from treatment of UHCs to UTS for land-disposed wastes that are hazardous only because they exhibit a hazardous characteristic (D001-D043) and if the wastes are decharacterized and managed by Class I underground injection or Clean Water Act (CWA) or equivalent systems. The hazardous waste characteristic can be removed by any means, including dilution or other deactivation through aggregation of different waste streams preceding land disposal (61 *FR* 15661, April 8, 1996). Thus, TC metal wastes that are managed in CWA or equivalent systems, which constitute practically all of the TC metal wastewaters (as determined during the Phase III LDR capacity analysis; 61 *FR* 15565, April 8, 1996) only have to meet characteristic levels prior to land disposal, a practice already required by RCRA Subtitle C permitting requirements (40 CFR Parts 264 and 265). Furthermore, EPA expects that are no quantities of TC metal wastewaters that are eligible for a capacity variance (i.e., TC metal wastes that would not fail the EP) because the old and the new extraction procedure (i.e., the EP and TCLP, respectively) result in the same leachate concentration for wastewaters. Finally, EPA did not receive any comments to the Phase IV proposed rules or notices indicating that any capacity issues existed for TC metal wastewaters. Therefore, TC metal wastewaters are not considered further in this capacity analysis. If capacity issues do subsequently arise, then generators may apply for a capacity variance extension per 40 CFR 268.5 on a case-by-case basis.

3.2 DATA SOURCES

EPA has collected available information on Phase IV TC metal wastes, including contaminated soil and debris, from a number of sources to support these LDRs. The primary data sources used in this capacity analysis are described in this section.

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[1] A more detailed discussion of the Agency's rationale and technical support for establishing universal treatment standards for TC wastes is provided in: USEPA, *Final Best Demonstrated Available Technology (BDAT) Background Document for Universal Standards,* July 1994, Volume A: Universal Standards for Nonwastewater Forms of Listed Hazardous Wastes, and Volume B: Universal Standards for Wastewater Forms of Listed Hazardous Wastes.

3.2.1 Information from Background Documents Developed for the Third Third Rulemaking

For the Third Third Rulemaking (55 *FR* 22520, June 1, 1990), the Agency conducted a comprehensive study on the TC metal waste generation and management at the industry and facility level. Information collected and analyzed for the Third Third rulemaking is used in the present analysis, as applicable, for characterizing the TC metal wastes.[2]

3.2.2 Comments from the ANPRM

On October 24, 1991 the Agency published an Advanced Notice of Proposed Rulemaking (ANPRM) (56 *FR* 55160) and requested comments and data on the development of treatment standards and quantities of wastes requiring alternative commercial capacity due to the LDRs for a group of newly listed wastes, including the TC metal wastes. Several commenters provided comments and data on the TC metal waste generation and management. Applicable comments and data are included in the capacity analysis described in this report.

3.2.3 USEPA Biennial Reporting System (BRS)

The BRS provides information on waste generation and management practices at the individual waste stream and facility level. The BRS is a system by which RCRA-regulated treatment, storage, and disposal facilities (TSDFs) and large quantity generators provide EPA with information on their hazardous waste activities. The BRS contains information on the waste streams generated on site and received from off site, waste physical form, waste codes, waste quantity, and the treatment systems used to treat each hazardous waste stream. Data from the BRS was the primary source for the analysis of required capacity for the TC metal wastes. A detailed description of the methodology and assumptions for using the BRS data are provided in Section 3.3.

3.2.4 Comments to Phase IV LDR Proposed Rule for TC Metal Wastes

On August 22, 1995, EPA published the original Phase IV LDR proposal and solicited comments on the waste quantities and management practices of the newly identified TC metal wastes that were impacted by this rule (60 *FR* 43654). In response to this proposal, several commenters provided comments and data on the TC metal waste generation and management. However, the Agency determined that additional data was needed and on May 10, 1996 the Agency published a Notice of Data Availability (NODA) as a supplement to the original Phase IV proposed rule (61 *FR* 21418). In this NODA, EPA requested additional information on the generation and management of the TC metal wastes and TC contaminated soil. Based on the available data and comments received in response to the various Phase IV LDR proposals, the Agency revised the UTS for 12 metal constituents in TC metal wastes and published the proposed treatment standards in the Phase IV LDR second supplemental proposed rule (62 *FR* 26041, May 12, 1997). Applicable data and comments submitted by commenters in response to all the Phase IV LDR proposals were combined and included in the capacity analysis described in this report. Comments are described in more detail in the Comment Summary

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[2] USEPA, *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*, May 1990, Chapter 2, page 2-1.

and Response Document.

3.3 WASTE GENERATION AND MANAGEMENT

TC metal wastes are generated by a wide variety of industries and in many different forms. Furthermore, the waste generation rates vary widely from industry to industry. However, the processes by which TC metal wastes are generated are similar for many of the metals. For a more detailed discussion of the potentially impacted industries and the specific compounds of interest for each TC metal, refer to the BDAT background materials in the RCRA docket for today's rulemaking.

As indicated in Section 3.1, two different categories of TC metal wastes are affected by this rule. First is the wastes that are (or would be) also hazardous using the EP. These wastes are currently required to be treated to the TC level. Second is the newly identified TC metal wastes (i.e., wastes that would pass the EP test but fail the TCLP test), which were not subject to LDR regulations prior to today's rule. Today, the Agency is promulgating regulations for both categories of TC metal wastes, although only the newly identified wastes are eligible for a capacity variance.

To estimate the quantity of potential Phase IV TC metal waste that is currently being generated[3] and currently being surface-disposed (and, thus, potentially requiring alternative treatment), the Agency relied primarily on the BRS. The following steps describe the methodology used to identify these wastes from the BRS:

1. Identify wastes that are TC metals (D004-D011) only. Data was extracted from the 1995 BRS GM Form for all of the TC metal waste streams that carried at least one TC metal code (D004-D011) and no other code. Thus, waste streams that carried a TC metal waste code along with a listed waste code (e.g., F, K, U, or P waste) or other characteristic waste code (e.g., a TC organic waste code) were excluded because listed wastes and TC organic wastes were addressed in previous rulemakings.

2. Determine quantities managed on and off site. The data were aggregated according to whether the waste was managed on site or shipped off site. The on-site quantity is the "quantity treated, disposed, or recycled in 1995" from the GM form and the off-site quantity is the "total quantity shipped in 1995." Total generation is the summation of these two quantities.

3. Exclude wastes reported by transfer facilities. To avoid double-counting, non-primary TC metal wastes derived from the management of a hazardous waste (origin code of 5 in the GM form) were eliminated.[4] Similarly, waste streams received from off site but not managed on site (origin code of 4

[3] For the purpose of this capacity analysis, and as discussed in more detail later in this section, the TC metal waste generation refers to wastes that carry only a TC metal code and that are not deep well injected or disposed without treatment under a National Pollutant Discharge and Elimination System (NPDES) permit.

[4] In general, non-primary waste streams (i.e., treatment residuals) are not included in the capacity estimates because if management practices change as a result of the LDRs, such residuals will no longer be generated.

in the GM form) were eliminated.[5]

4. Exclude selected wastes. Deepwell/underground injection wastes (waste code M134) and wastes that are directly discharged to surface water under NPDES without prior treatment (waste code M136) were excluded. Underground injected wastes are addressed by a separate analysis and the NPDES wastes are not subject to the LDRs.

5. Aggregate waste quantities by physical form. The generated quantities were aggregated by inorganic and organic liquids, inorganic and organic solids, inorganic and organic sludges, and other. The "other" category includes inorganic and organic gases and lab packs.

6. Aggregate waste quantities by waste code. Waste streams with multiple TC metal waste codes were grouped separately as "mixture" streams.

Exhibit 3-2 provides the TC metal-only waste quantities generated in 1995 by waste code and waste type.[6] The same data are presented in Exhibit 3-3, but organized by system type and waste code. As seen in Exhibits 3-2 and 3-3, approximately 31 million tons of TC metal-only wastes are generated and managed off site annually. Of these wastes, the vast majority, 29.6 million tons, are currently being treated (Exhibit 3-4). The remaining 1.5 million tons of TC metal-only wastes (approximately five percent of the total TC metal-only waste generated annually) are either directly surface-disposed, shipped to transfer facilities, or reported as managed in unknown system types. Note, however, that Exhibits 3-2 and 3-3 address total TC metal-only waste generation, not the quantity of TC metal-only wastes potentially affected by the Phase IV LDRs. Several additional steps were taken and assumptions were made to estimate this latter quantity.

The first key assumption developed to identify TC metal wastes affected by the LDRs involved wastewaters. As discussed in Section 3.1, the Land Disposal Program Flexibility Act (LDPFA) signed by the President on March 26, 1996 overruled the DC Court of Appeals' 1992 opinion in *Chemical Waste Management, Inc. et al. v. EPA* with respect to the requirement for minimized threat treatment standards for decharacterized wastes that are decharacterized and managed in CWA/CWA-equivalent/Class I Safe Drinking Water Act (SDWA) systems. Therefore, TC wastes that are managed in CWA/CWA-equivalent systems do not need to meet the Phase IV LDR requirements. More importantly, because the TCLP and EP are identical in terms of wastewaters, there are no newly identified TC metal wastewaters being generated and thus a variance decision is moot. Thus, wastewaters are excluded from this analysis (although liquid nonwastewaters are included). However, residues resulting from the treatment of these wastewaters are usually managed as nonwastewaters and, thus, are included in the BRS.

[5] Waste streams that are sent to a transfer facility and then sent to a hazardous waste management facility are supposed to be reported in the BRS at least twice, once by the facility generating the waste and once by the facility transferring the waste.

[6] See Appendix D for the 1995 BRS data used for this analysis.

EXHIBIT 3-2
1995 GENERATION OF TC METAL-ONLY WASTES (TONS) [a]

Waste Code	Inorganic Liquids	Organic Liquids	Inorganic Solids	Organic Solids	Inorganic Sludges	Organic Sludges	Other	Total
Arsenic (D004)	88,119	1,532	3,968	197	658	12	386	94,872
Barium (D005)	42,124	299	23,038	254	324	164	1,460	67,664
Cadmium (D006)	1,979,380	795	45,968	448	166,229	77	457	2,193,354
Chromium (D007)	14,994,427	68,936	73,146	1,117	415,366	311	78,724	15,632,027
Lead (D008)	3,504,207	15,468	2,738,079	20,445	370,183	1,652	61,797	6,711,831
Mercury (D009)	2,598,601	360	7,625	136	50	26	651	2,607,449
Selenium (D010)	446,490	81	1,445	1	1,877	7	42	449,943
Silver (D011)	205,548	1,866	587	26	4,843	9	311	213,190
Mixtures	2,897,891	19,286	140,895	4,173	17,351	1,479	31,077	3,112,152
Total	**26,756,786**	**108,624**	**3,034,751**	**26,798**	**976,880**	**3,738**	**174,905**	**31,082,483**

[a] For the purpose of this capacity analysis, the TC metal waste generation refers to wastes that carry only a TC metal code and that are not deep well injected or disposed without treatment under a NPDES permit.

EXHIBIT 3-3
1995 GENERATION OF TC METAL-ONLY WASTES
ORGANIZED BY SYSTEM TYPE AND WASTE CODE (TONS)

	Arsenic (D004)	Barium (D005)	Cadmium (D006)	Chromium (D007)	Lead (D008)	Mercury (D009)	Selenium (D010)	Silver (D011)	Mixtures	Total
Metals Recovery (For Reuse)										
High Temperature Metals Recovery (HTMR) (M011)	5	0	553	3,188	1,844	45	0	180	1,230	7,045
Retorting (M012)	0	0	2	0	790	1,400	0	1	69	2,264
Secondary Smelting (M013)	0	0	313	110	164,212	37	0	182	799	165,651
Other Metals Recovery For Reuse (M014)	364	129	7,292	49,258	47,291	113	0	2,779	485	107,710
Metals Recovery (M019)	37	10	76	497	18,024	850	1	1,633	1,260	22,389
Solvents Recovery										
Fractionation/Distillation (M021)	0	5	13	6	145	6	0	2	214	391
Thin Film Evaporation (M022)	11	1	0	2	14	0	0	3	0	32
Solvent Extraction (M023)	0	0	1	0	0	0	0	6	6	14
Other Solvent Recovery (M024)	0	0	0	0	20	0	0	0	1,185	1,206
Solvents Recovery - Type Unknown (M029)	0	4	34	47	182	0	0	9	56	332
Other Recovery										
Acid Regeneration (M031)	0	0	0	5,684	1	0	0	0	3	5,688
Other Recovery (M032)	132	0	26	750	1,140	58	0	0	1,192	3,298
Other Recovery - Type Unknown (M039)	1	92	54	503	2,240	469	17	15	912	4,302
Incineration										
Incineration - Liquids (M041)	421	230	72	6,312	640	389	23	99	335	8,520
Incineration - Sludges (M042)	13	4	25	257	246	0	3	2	327	876
Incineration - Solids (M043)	147	228	144	862	1,541	103	4	13	2,466	5,508
Incineration - Gases (M044)	0	0	3	0	1	0	0	0	1	6
Incineration - Type Unknown (M049)	2	1	322	5,464	113	16	12	111	172	6,213

EXHIBIT 3-3 (continued)
1995 GENERATION OF TC METAL-ONLY WASTES
ORGANIZED BY SYSTEM TYPE AND WASTE CODE (TONS)

	Arsenic (D004)	Barium (D005)	Cadmium (D006)	Chromium (D007)	Lead (D008)	Mercury (D009)	Selenium (D010)	Silver (D011)	Mixtures	Total
Energy Recovery (Reuse as Fuel)										
Energy Recovery - Liquids (M051)	797	9	24	1,382	751	1	0	18	2,996	5,978
Energy Recovery - Sludges (M052)	0	0	0	14	1	0	0	0	39	54
Energy Recovery - Solids (M053)	4	203	58	129	243	1	0	1	226	864
Energy Recovery - Type Unknown (M059)	0	0	1	10	162	0	0	0	63	236
Fuel Blending										
Fuel Blending (M061)	8	343	240	934	3,491	40	20	20	1,773	6,869
Aqueous Inorganic Treatment										
Chrome Reduction Followed by Chemical Precipitation (M071)	0	0	43	13,081,164	1,262	0	0	1	511,572	13,594,042
Cyanide Destruction Followed by Chemical Precipitation (M072)	0	0	192,319	22,569	229	0	0	69,112	279,304	563,534
Cyanide Destruction Only (M073)	0	0	12,339	1,908	0	0	0	8,205	0	22,452
Chemical Oxidation Followed by Chemical Precipitation (M074)	1,646	0	7,400	51,449	68,264	0	0	3,514	46,914	179,188
Chemical Oxidation Only (M075)	0	0	0	0	0	1	0	0	0	2
Chemical Precipitation (M077)	45,562	41,601	442,427	858,094	3,614,819	1,229,376	81	52,055	1,869,927	8,153,941
Other Aqueous Inorganic Treatment (M078)	40	0	65,170	1,017,977	2,385,687	809,226	963	8,900	2,875	4,290,839
Aqueous Inorganic Treatment - Type Unknown (M079)	42	37	27	1,522	760	9	14	100	4,323	6,833

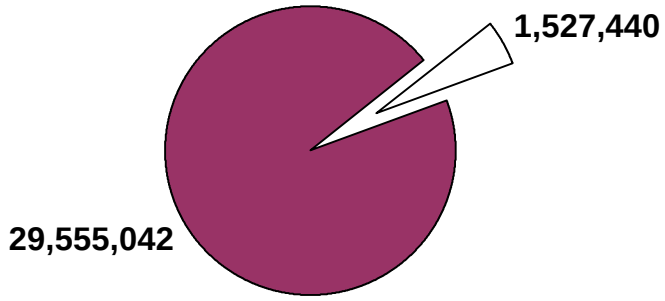
EXHIBIT 3-3 (continued)
1995 GENERATION OF TC METAL-ONLY WASTES
ORGANIZED BY SYSTEM TYPE AND WASTE CODE (TONS)

	Arsenic (D004)	Barium (D005)	Cadmium (D006)	Chromium (D007)	Lead (D008)	Mercury (D009)	Selenium (D010)	Silver (D011)	Mixtures	Total
Aqueous Organic Treatment										
Biological Treatment (M081)	0	25	1,333	319	2,932	30	252,155	8,599	1,882	267,274
Carbon Adsorption (M082)	2	0	0	48	2	949	0	0	0	1,000
Air/steam Stripping (M083)	0	0	0	0	0	0	0	1	0	2
Wet Air Oxidation (M084)	0	0	0	8	0	0	0	0	0	8
Other Aqueous Organic Treatment (M085)	129	0	6	431	1,146	0	0	0	29	1,741
Aqueous Organic Treatment - Type Unknown (M089)	19	0	11	98	112	8	0	39	39	325
Aqueous Organic and Inorganic Treatment										
Chemical Precipitation in Combination with Biological Treatment (M091)	86	0	23	6,923	1,231	89	0	354	7,595	16,301
Chemical Precipitation in Combination with Carbon Adsorption (M092)	415	13	22,906	2,334	526	17	0	11	6,634	32,856
Other Organic/Inorganic Treatment (M094)	41	14	171	3,268	2,122	26	31	18	4,535	10,226
Aqueous Organic and Inorganic Treatment - Type Unknown (M099)	4	481	51	2,340	10,621	96	34	88	2,635	16,348
Sludge Treatment										
Sludge Dewatering (M101)	94	0	38,935	54,352	602	0	7	31	35,136	129,157
Addition of Excess Lime (M102)	0	0	0	12	351	0	0	0	10	373
Solvent Extraction (M104)	0	0	0	0	0	0	0	38	0	38
Sludge Treatment - Type Unknown (M109)	0	0	47	183	369	3	0	86	267	955
Stabilization										
Stabilization/Chemical Fixation Using Cementitious and/or Pozzolanic Materials (M111)	841	1,766	39,022	13,393	122,174	1,357	2,372	23	55,855	236,802
Other Stabilization (M112)	219	385	95	1,282	25,641	10	0	0	10,556	38,189
Stabilization - Type Unknown (M119)	13	400	494	1,800	13,587	438	921	118	3,862	21,633

EXHIBIT 3-3 (continued)
1995 GENERATION OF TC METAL-ONLY WASTES
ORGANIZED BY SYSTEM TYPE AND WASTE CODE (TONS)

	Arsenic (D004)	Barium (D005)	Cadmium (D006)	Chromium (D007)	Lead (D008)	Mercury (D009)	Selenium (D010)	Silver (D011)	Mixtures	Total
Other Treatment										
Neutralization Only (M121)	62	6	663,059	27,053	5,372	1	0	16	13,025	708,593
Evaporation Only (M122)	0	0	88	17,408	415	1	0	218	381	18,511
Settling/Clarification Only (M123)	32,953	0	199,508	303	12	1	0	2	15	232,794
Phase Separation Only (M124)	0	1	3	36	1,013	4	0	54,601	11,154	66,812
Other Treatment (M125)	7,798	19,366	156	46,887	38,497	346,053	0	63	111,185	570,005
Other Treatment - Type Unknown (M129)	41	32	121	447	2,712	46	7	72	2,841	6,319
Disposal										
Land Treatment/Application/Farming Landfill (M131)	0	0	11	3	34	3	0	0	153	203
Landfill (M132)	2,302	1,570	5,550	5,817	85,213	2,395	8	83	69,761	172,699
Surface Impoundment (to be Closed as a Landfill) (M133)	1	0	491,430	3	3,233	5	0	0	78	494,751
Direct Discharge to Sewer/Publicly Owned Treatment Works (POTW) (No Prior Treatment) (M135)	0	3	151	26,393	27	0	193,193	43	9,165	228,975
Other Disposal (M137)	46	55	64	295,241	40,195	211,980	0	582	19,489	567,653
TSDR Facility (M141)	577	643	1,095	15,154	28,487	1,783	75	989	14,355	63,158
Unknown										
	0	5	48	401	11,093	13	0	155	789	12,505
GRAND TOTAL	94,872	67,664	2,193,354	15,632,027	6,711,832	2,607,449	449,943	213,190	3,112,152	31,082,483

EXHIBIT 3-4
1995 GENERATION AND MANAGEMENT
OF TC METAL-ONLY WASTES (TONS)



■ Volume of TC metal-only waste treated

□ Volume of TC metal-only waste surface-disposed, shipped to transfer facilities, or reported as managed in unknown systems

To develop lower- and upper-bound estimates of the quantity of surface-disposed TC metal wastes and, thus, of wastes that may require alternative treatment or recovery capacity upon promulgation of the Phase IV LDR rule, the Agency applied two key sets of assumptions:

1. For the upper-bound estimate, the Agency used the conservative assumption that all of the TC metal nonwastewaters that are either surface-disposed (i.e., where the system type was land treatment, landfill, surface impoundment, or "other" disposal), shipped to transfer facilities, or reported as managed in invalid system types (e.g., when M141 (transfer off-site) is used as an on-site treatment) will require at least some form of alternative treatment/recovery to meet the new treatment standards. The actual quantity is likely to be lower than this for two main reasons: (1) many of these waste streams are not surface-disposed and, thus, would not require alternative capacity; and (2) many facilities likely will make modifications in their production processes and/or waste management in order to avoid the LDRs.

2. For the lower-bound estimate, EPA primarily used the assumption that only the reported surface-disposed wastes would require alternative capacity. The actual quantity is likely to be higher than this because many of the waste streams that are surface-disposed (and, thus, would likely require alternative capacity) are not reported as such in the BRS. This non-reporting is primarily due to small quantity generators (SQGs) and to the fact that when TC metal wastes are decharacterized through treatment (e.g., stabilization), they are no longer hazardous and, thus, their ultimate disposal no longer needs to be reported in the BRS. EPA believes that this non-reporting eclipses any of the reasons that would tend to indicate that this estimate would not be a lower bound.[7]

Exhibits 3-5 and 3-6 provide the upper-bound and lower-bound estimates of surface-disposed TC metal wastes potentially requiring alternative treatment, which are approximately 1.3 million tons and 0.7 million tons per year, respectively. These estimates compare favorably with an estimate of 1 million tons per year that was obtained by summing the surface disposed volumes of D004-D011 wastes requiring alternative capacity estimated for the Third Third Rule.[8]

[7] For example, many facilities likely will make modifications in their production processes and/or waste management in order to avoid RCRA Subtitle C and the LDRs.

[8] USEPA, *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*, May 1990, Volume I, Executive Summary, page E-22. Note, however, that the estimate of 1 million obtained from the Third Third Rule background document only includes one of the TC metal categories—EP metal—while the TC metal estimates of 0.7 million to 1.3 million developed for this Phase IV rule include both categories of TC metal waste—EP and non-EP. On the other hand, during the time period since the Third Third Rule, efforts on waste minimization and pollution prevention have reduced the generation of hazardous wastes, which would not be captured in the estimate from the Third Third Rule.

EXHIBIT 3-5
UPPER-BOUND ESTIMATES OF SURFACE-DISPOSED TC METAL WASTES (TONS)

Waste Code	Inorganic Liquids	Organic Liquids	Inorganic Solids	Organic Solids	Inorganic Sludges	Organic Sludges	Other	Total
Arsenic (D004)	97	305	2,027	26	105	10	356	2,926
Barium (D005)	138	50	986	45	10	79	965	2,273
Cadmium (D006)	341,080	83	5,596	252	150,851	5	331	498,198
Chromium (D007)	265,076	37,741	12,104	553	688	67	389	316,620
Lead (D008)	2,222	5,275	119,294	2,827	988	201	37,449	168,255
Mercury (D009)	212,190	51	3,394	85	5	25	429	216,180
Selenium (D010)	40	20	22	0	2	0	0	84
Silver (D011)	1,231	275	123	2	35	0	143	1,809
Mixtures	10,288	1,341	73,436	1,860	1,768	634	15,298	104,625
Total	**832,362**	**45,141**	**216,982**	**5,649**	**154,453**	**1,022**	**55,361**	**1,310,970**

Data Source: 1995 Biennial Reporting System.

EXHIBIT 3-6
LOWER-BOUND ESTIMATES OF SURFACE-DISPOSED TC METAL WASTES (TONS)

Waste Code	Inorganic Liquids	Organic Liquids	Inorganic Solids	Organic Solids	Inorganic Sludges	Organic Sludges	Other	Total
Arsenic (D004)	23	10	1,839	22	89	9	310	2,303
Barium (D005)	0	25	598	36	0	9	901	1,570
Cadmium (D006)	340,939	1	4,859	216	150,819	0	156	496,991
Chromium (D007)	227	75	4,704	297	357	16	147	5,823
Lead (D008)	109	4,451	66,906	2,189	687	145	3,362	77,848
Mercury (D009)	6	0	2,141	27	1	20	207	2,403
Selenium (D010)	0	0	8	0	0	0	0	8
Silver (D011)	7	3	73	0	0	0	1	83
Mixtures	224	10	65,773	871	1,540	385	1,190	69,992
Total	**341,536**	**4,575**	**146,900**	**3,660**	**153,493**	**585**	**6,274**	**657,022**

Data Source: 1995 Biennial Reporting System.

A significant increase in the amount of TC metal wastes requiring alternative treatment is not expected as a result of the Phase IV LDRs because many of the newly identified TC metal wastes are likely already being treated to TC levels or are not surface-disposed (as discussed above). Therefore, the Agency believes that the quantity of TC metal waste that might require alternative treatment is certainly within and likely even below the range of 0.7 million tons and 1.3 million tons. A much smaller quantity is expected to be newly identified and thus even eligible for a capacity variance.

3.4 SOIL CONTAMINATED WITH NEWLY IDENTIFIED TC METAL WASTES

The Agency estimates that approximately 2,680,000 tons of soil contaminated with hazardous waste (all types, including TC metals) are treated annually in the United States.[9] This estimate was obtained by examining data on volumes generated through CERCLA, RCRA corrective action, RCRA closures, State superfund, and voluntary cleanup programs. Of the total volume of contaminated soil treated annually, approximately 890,000 tons are treated ex-situ outside of Corrective Action Management Units (CAMUs) and Areas of Contamination (AOCs), and therefore are potentially affected by the Phase IV LDRs. As discussed further in Appendix E-1, however, only a portion of this quantity—approximately 55,000 tons/year—is TC metal-only soil. Furthermore, only the portion of this soil that is not also EP toxic is eligible for a capacity variance.[10] Finally, only some of this non-EP soil is expected to require alternative capacity. The remainder either will not be affected by the LDRs or will require less treatment. This latter point (i.e., some wastes will require less treatment) is due to the fact that the new treatment standards are less stringent than current treatment standards for those wastes. See Appendix E for additional discussion of affected wastes.

Regarding treatment for these soils, EPA has determined that it is generally unsuitable or impractical from a technical standpoint to burn large volumes of highly contaminated soil.[11] The Agency has documented potential difficulties that may arise from the combustion of soils due to soil/contaminant characteristics that affect incineration performance, such as the concentrations of volatile metals, the presence of alkali salts, fine particles of soils such as clays and silts, and the ash fusion point of the contaminating waste. For example, operation of an incinerator at or near the waste ash fusion temperature can cause melting and agglomeration of inorganic salts. The loading of clays and silts in some soils may also result in high loadings of particulate matter in flue gases.[12]

In a remedial context, application of current LDRs to contaminated soils often presents remediation

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[9] USEPA, *Application of the Phase IV Land Disposal Restrictions to Contaminated Media: Costs, Cost Savings, and Economic Impacts (Draft)*, February 23, 1998, Chapter 2.

[10] As discussed in Chapter 1, EP toxic wastes were addressed during the Third Third Rule. Consequently, EP toxic wastes are not newly identified wastes and thus are no longer eligible for a capacity variance. One exception to this is EP toxic mineral processing wastes addressed in Chapter 4.

[11] 55 FR 8760, March 8, 1990 and 61 FR 18806, April, 29, 1996.

[12] See USEPA, *Final BDAT Background Document for Hazardous Soils*, August 1993, page 3-12 and USEPA, *Technology Screening Guide for Treatment of CERCLA Soils and Sludges*, September 1988.

project managers with only two options: (1) cap or treat hazardous contaminated media in place thereby avoiding LDRs; or (2) excavate the media and treat it to the full extent of BDAT, often incineration. The Agency has found that this situation often creates an incentive to select remedies that minimize the application of LDRs (e.g., remedies that involve capping or leaving untreated waste in place), a result obviously not contemplated by Congress in enacting the LDRs.[13] Recognizing the unique issues associated with contaminated soils, therefore, the Agency is promulgating alternative LDR treatment standards (10 times UTS or 90 percent reduction) for these wastes in today's rule. The soil-specific treatment standards being promulgated will apply to all contaminated soil that is restricted from land disposal, including but not limited to hazardous soils contaminated by TC metal and mineral processing wastes.[14] EPA believes that the alternative standards will significantly improve the management of hazardous soil by increasing treatment options, encouraging implementation of more aggressive or permanent remedies, substantially reducing hazardous constituent concentration, and minimizing threats to human health and the environment. Appendix E-2 discusses several of the treatment options that EPA expects will be used to meet these new treatment standards.

The alternative treatment standards being promulgated today are based primarily on the data for soil treatability found in EPA's Soil Treatability Database.[15] After analyzing the data contained in the database, the Agency concluded that the alternative soil treatment standards can be reliably achieved using a variety of demonstrated treatment technologies, including biological treatment, chemical extraction, dechlorination, HTMR, soil washing, stabilization, and thermal desorption. In addition, the Agency compiled treatment performance data for contaminated soils from remediation sites that indicate that the alternative treatment standards are already being achieved at most sites by innovative treatment technologies (see Appendix E-3). Several discussions with treaters support these findings (see Appendix E-4). EPA's findings are supported by data submitted by three commenters (Hazardous Waste Treatment Council, USPCI, and DuPont) in response to the proposed Phase II rule.[16] These commenters provided performance data on technologies or extensive literature reviews documenting the availability and limitations of innovative technologies.

An analysis conducted previously by the Agency on the use of established and innovative technologies indicates that in recent years there has been a reduction in the reliance on incineration and an increase in the use of innovative treatment technologies at remedial sites (see Appendix E-5). The most commonly used innovative treatment technologies are soil vapor extraction, thermal desorption, and bioremediation, which together are applied approximately 37 percent of the time. (For comparison, stabilization is applied only 30 percent of the time and, incineration only 24 percent). Preference for the use of these technologies can be likely attributed to their cost-effectiveness and performance. The Agency identified more than 100 vendors of these innovative treatment technologies (see Appendix E-6). Discussions with some of these vendors indicate that these technologies can be readily optimized to meet new

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[13] 61 FR 18808, April 29, 1996.

[14] See Section VII—LDR Treatment Standards for Soil—of today's preamble.

[15] USEPA, *Final Proposed Best Demonstrated Available Technology (BDAT) Background Document for Hazardous Soil*, August 1993, page 5-1.

[16] 59 *FR* 47982, September 19, 1994.

treatment standards (see Appendix E-4). In addition, vendors indicated that they currently are operating well under their maximum capacity and that they have the manpower and equipment to expand capacity rapidly. Furthermore, capacity data provided by just four of these vendors indicate that they have sufficient available capacity to treat several million additional tons/year of soil (or the equivalent of over 100 sites).[17] As discussed earlier in this section, less than 55,000 tons/year (equivalent to only about two sites) of TC metal-only soil is expected to require alternative capacity.

The Agency also recognizes that the alternative soil treatment standards, which as indicated above are less stringent than the current treatment standards, will increase the availability of capacity to treat soil contaminated with TC metal wastes. The alternative treatment standards will provide relief for on-going remediation programs because wastes such as TC organic soils will require less treatment. EPA recognizes, however, that implementation of the alternative soil treatment standards at some sites probably will not be immediate because some States may not adopt the potentially less stringent soil standards and because there will be some time between the selection and actual implementation of remedial treatment technologies. Furthermore, as indicated in the RIA for contaminated media for this rule,[18] this additional capacity will be roughly matched by the required capacity for some non-TC metal-only soils (e.g., soil contaminated with some listed wastes) affected by the Phase IV rule (although, as discussed previously, these wastes are not eligible for a capacity variance). See Appendix E-1 for additional discussion of this issue.

Given all of the above factors, EPA believes that adequate alternative treatment capacity will be available for contaminated soil affected by the Phase IV rule. Therefore, the Agency is not granting a variance for soil contaminated with theses wastes (beyond the 90 days allowed prior to the effective date of the rule).[19]

Notwithstanding this analysis, the Agency recognizes that some wastes could possess unique properties that make them more difficult to treat than the wastes on which the standards are based. In such cases, the affected party may petition the Agency for a treatability variance per 40 CFR 268.44. For newly identified wastes (i.e., wastes that do not fail the EP test, and, consequently, are not part of the Third Third LDR Rule), the affected party may also request a capacity variance extension per 40 CFR 268.5 on a case-by-case basis. Wastes regulated in the Third Third LDR Rule (i.e., wastes that fail the EP test) are not eligible for capacity variances because the extension provided in that rulemaking has already expired.

In addition, EPA is establishing a new site-specific, risk-based variance for the technology-based

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[17] As presented in Appendix E-4, four vendors provided data on their available commercial treatment capacity. Envirogen, Inc. indicated that they have available capacity to treat 100 additional sites. Alternative Remedial Technologies, Inc. stated that they have sufficient capacity to immediately treat an additional two sites. ReTec reported that they have available capacity for 100,000 to 150,000 tons/year of soil. Finally, Roy F. Weston reported that they could immediately treat an additional 15,000 or so tons/year of contaminated soil. Using an average estimate of 28,000 tons of soil per site (see Appendix E-1), these data translate into several million tons of contaminated soil per year or over 100 sites.

[18] USEPA, *Application of the Phase IV Land Disposal Restrictions to Contaminated Media: Costs, Cost Savings, and Economic Impacts (Draft)*, February 23, 1998, Chapter 2.

[19] Note that this does not change the variance already provided to some soil contaminated with wood preserving wastes covered by the "Mini" Phase IV or Rule (62 FR 25998, May 12, 1997). See Appendix E-7.

alternative soil treatment standards. This variance can be used when treatment to concentrations of hazardous constituents that are greater (i.e., higher) than those specified in the alternative soil treatment standards is shown to minimize short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could "cap" the technology-based treatment standards.

3.5 MIXED RADIOACTIVE TC METAL WASTES

For previous LDR rulemakings, EPA received numerous comments and data concerning the generation and treatment of mixed waste. Based on these comments, EPA believes that DOE facilities generate the vast majority of mixed waste. According to EPA's analysis for the Third Third rulemaking, non-DOE mixed waste accounts for less than one percent of all mixed waste generated nationwide.[20]

In response to the various Phase IV proposed rules, the Agency received data on mixed radioactive wastes from only two commenters. The first commenter (Westinghouse Electric Corporation) reported that 133,565 cubic meters of non-wastewater material (including D011) from the Savannah River Site (Department of Energy (DOE) facility managed by Westinghouse) would be land disposed.[21] The second commenter (DOE) reported that approximately 41,350 cubic meters of non-wastewater D011 mixed radioactive wastes are stored at DOE sites and that additional non-wastewater D011 wastes are projected to be generated during the coming five years.[22] Both commenters stated that, in the future, they are planning to treat such streams using macroencapsulation, stabilization, vitrification, or incineration technologies. It is unclear what portion, if any, of these wastes are newly identified.

In today's rule, the Agency is promulgating treatment standards for mixed radioactive wastes at the UTS levels. However, as discussed in Chapter 2, the Agency recognizes the lack of available treatment capacity for these wastes and believes that any new commercial capacity that is available for mixed radioactive wastes must be used for mixed wastes that were regulated in previous LDR rulemakings and whose variances have already expired. Therefore, the Agency is granting a two-year national capacity variance for newly identified mixed radioactive TC metal wastes.

3.6 CAPACITY ANALYSIS

For estimating the required treatment capacity for TC metal wastes, the Agency used data from the BRS database (see Section 3.3) to determine that most of these wastes currently are managed in compliance with RCRA Subtitle C requirements (but not necessarily with Phase IV LDRs), and thus the wastes generally are either disposed in a Subtitle C permitted unit or treated to remove the hazardous characteristic and then

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[20] USEPA, *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*, May 1990, Volume III, Appendix B, page 1.

[21] Comment letter No. 14 in response to the Phase IV LDR Second Supplemental Proposed Rule (62 *FR* 26041, May 12, 1997).

[22] Comment letter No. 23 in response to the Phase IV LDR Second Supplemental Proposed Rule (62 *FR* 26041, May 12, 1997).

disposed in Subtitle D units. EPA's economic analysis indicates that treatment and Subtitle D disposal is less expensive than Subtitle C disposal without treatment, in most cases.[23] Furthermore, as described in Chapter 2, the Agency has determined that technologies used to treat wastes to the point of removing the hazardous characteristic can also be used to meet the UTS standards with only minor modifications and/or optimization that can take place in less than 90 days. Thus, most TC metal wastes are already meeting treatment standards or can do so soon. Any newly identified (i.e., non-EP) TC metal wastes can be readily addressed by the large quantity of available capacity discussed in Chapter 2. This section provides a waste code-specific discussion of the TC metal wastes, including soils, mixtures, UHCs, and any unique features that could have a potential impact on the capacity determination.[24] Relevant comments and data submitted by the commenters in response to the ANPRM (56 *FR* 55160, October 24, 1991), the original Phase IV LDR proposal for TC metal wastes (60 *FR* 43654, August 22, 1995), the May 10, 1996 NODA (61 *FR* 21418), and the second supplemental proposed rule (62 *FR* 26041, May 12, 1997) are also included in this discussion.

3.6.1 Arsenic (D004)

As shown in Exhibits 3-5 and 3-6, approximately 2,300 to 2,900 tons of D004-only nonwastewater wastes are surface disposed each year. In today's rule, EPA is promulgating LDRs for these wastes. The treatment standard for D004 nonwastewaters is being set to a UTS level of 5.0 mg/l (Exhibit 3-7). Therefore, there is no change in the treatment standard due to this rulemaking (i.e., the TC level and the UTS level are the same). Because the newly identified arsenic wastes likely are already being treated to the TC levels to facilitate Subtitle D management of the waste (see Section 3.3), additional treatment likely would only be required primarily for UHCs. One commenter, Chemical Waste Management (CWM), stated that some arsenic poses technical problems in achieving UTS levels through stabilization technology, and that EPA should establish a high arsenic (> 200 ppm) subcategory. However, the Agency conducted site visits to the commercial treatment facilities to assess the treatability of TC metals using stabilization and collected treatment performance data, which show that arsenic could be treated to the proposed UTS levels using stabilization.[25] Furthermore, data on the large amount of available capacity and on the small amount of time needed to optimize existing systems indicates that treatment capacity is not an issue (see Chapter 2). Therefore, the Agency is making no changes to the proposed UTS level or variance decision for arsenic wastes.

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[23] Research Triangle Institute, *Regulatory Impact Analyses: Phase IV Land Disposal Restrictions - TC Organometallic Wastes, Preliminary Draft Report* prepared for USEPA, December 1, 1997.

[24] Note that the waste code-specific discussions in Sections 3.6.1 to 3.6.9 are relevant to wastes containing TC metal-only, with little or no UHCs. Section 3.6.10 addresses TC metal-only wastes with UHCs.

[25] Memoranda addressed to Anita Cummings from ICF: "Final Draft Trip Report for Mill Services," dated November 21, 1996; "Final Draft Trip Report for Rollins Highway 36 Facility," dated November 21, 1996; "Final Draft Site Visit Report for the September 11th Site Visit to GNB Battery Technologies Located in Frisco, Texas," dated December 6, 1996. These reports from site visits are available in the docket for today's rule.

EXHIBIT 3-7
TC METAL REGULATORY LEVELS AND FINAL UNIVERSAL TREATMENT STANDARDS (NONWASTEWATER)
(Calculated from HTMR and Stabilization Sample Sets)[a]

TC Metal	TC Level (mg/l TCLP)	Existing UTS level (mg/l TCLP)	Proposed UTS Level[b] (mg/l TCLP)	Final UTS (mg/l TCLP)
Arsenic (D004)	5.0	5.0	--	5.0
Barium (D005)	100	7.6	21	21
Cadmium (D006)	1.0	0.19	0.20	0.11
Chromium (Total) (D007)	5.0	0.86	0.85	0.60
Lead (D008)	5.0	0.37	0.75	0.75
Mercury Retort Residues (D009)	0.20	0.20	--	0.20
Mercury (D009-All Others)	0.20	0.025	--	0.025
Selenium (D010)	1.0	0.16	5.7	5.7
Silver (D011)	5.0	0.30	0.11	0.14
Antimony	--	2.1	0.07[c]	1.15
Beryllium	--	0.014	0.02[c]	1.22
Nickel	--	5.0	13.6	11
Thallium	--	0.078	0.20	0.20
Vanadium[d]	--	0.23	1.6	1.6
Zinc[d]	--	5.3	4.3	4.3

[a] The universal treatment standard (UTS) being promulgated today were established by selecting the higher of the two treatment standards that were calculated from stabilized wastes and HTMR residues

[b] 62 FR 26041, May 12, 1997.

[c] The proposed UTS levels for antimony and beryllium were rounded up to the nearest 0.01 mg/l TCLP.

[d] Vanadium and zinc are not “underlying hazardous constituents” according to the definition at 40 CFR 268.2(i).

3.6.2 Barium (D005)

As shown in Exhibits 3-5 and 3-6, approximately 1,600 to 2,300 tons/year of D005-only nonwastewaters wastes are surface disposed. Today, EPA is promulgating a UTS level of 21 mg/l for nonwastewater forms of D005, as proposed in the second supplemental proposed rule (62 *FR* 26041, May 12, 1997). This value is about an 80 percent reduction in the existing treatment standard (i.e., a TC level of 100 mg/L TCLP), but is significantly higher than the proposed level of 7.6 mg/l. No comments were received that provided data on or otherwise discussed the treatment capacity for this TC metal waste code. Therefore, because these wastes are already being treated to a large degree (see Section 3.3), and any necessary additional treatment is expected to be readily available (as described in Chapter 2), D005-only wastes do not appear to present any particular capacity problems.

3.6.3 Cadmium (D006)

Approximately 497,000 to 498,200 tons of D006-only nonwastewaters wastes are surface disposed each year (Exhibits 3-5 and 3-6). In today's rule, EPA is promulgating a UTS level of 0.11 mg/l for nonwastewater forms of D006. This is approximately a 90 percent reduction in the existing treatment standard (i.e., a TC level of 1.0 mg/L TCLP).

AFS and the TDJ Group, commenting to the original proposal, suggested that stabilization technologies have not been shown to treat cadmium to the proposed UTS level. These commenters also implied that waste streams containing cadmium along with other metal constituents present additional treatment problems. TDJ Group stated that approximately 500,000 to 1,000,000 tons of D006-D008 wastes will be affected by the proposed Phase IV rule, which is comparable to the approximately 580,700 to 983,100 tons of surface-disposed D006-D008 wastes that EPA estimated using the BRS (taking into account that not all of these wastes will be affected, and that the upper-bound includes a large one-time generation amount of inorganic lead solids). Furthermore, these commenters, in addition to others, suggested that HTMR is not commercially available for treatment and that stabilization is the only commercially available treatment technology for many TC metal wastes. However, no data were received in response to the original Phase IV proposal (60 *FR* 43654, August 22, 1995) and the first supplemental proposal (61 *FR* 2338, January 25, 1996) on the available treatment capacity for this TC metal waste.

In order to address commenters' concerns regarding the lack of stabilization data on TC metal wastes, the Agency conducted site visits to commercial hazardous wastes treatment facilities and collected additional stabilization treatment performance data that better characterized the diversity of metal wastes.[26] These waste streams contained multiple metals, which would be representative of a characteristic waste with UHCs and significant concentrations of combination metals including: lead and cadmium, barium and lead, and chromium and antimony. Based on the waste characteristics affecting performance of the treatment technology, EPA believes that these wastes represent the most difficult to treat wastes. Therefore, the Agency believes that the performance data used to develop the UTS proposed in the second supplemental rule (62 *FR* 26041, May 12, 1997) adequately characterize the diversity among metal-bearing wastes including wastes containing multiple metals. However, the Agency has identified a technical error in the BDAT

[26] Memoranda addressed to Anita Cummings from ICF: "Final Draft Trip Report for Mill Services," dated November 21, 1996; "Final Draft Trip Report for Rollins Highway 36 Facility," dated November 21, 1996; "Final Draft Site Visit Report for the September 11th Site Visit to GNB Battery Technologies Located in Frisco, Texas," dated December 6, 1996. These reports from site visits are available in the docket for today's rule.

treatment standard, EPA failed to perform a "Z-score" outlier test.) The Agency corrected this error, re-calculated the cadmium treatment standard, and is promulgating the UTS for cadmium at 0.11 mg/l TCLP. This standard is more stringent than the proposed standard. Nevertheless, based on the treatment performance data reviewed and the available capacity (see Chapter 2), and given that these wastes are already being treated to a large degree (see Section 3.3), the Agency believes that this new standard is readily achievable by commercial treatment technologies such as stabilization and HTMR. Therefore, D006-only wastes do not appear to present any particular capacity problems.

3.6.4 Chromium (D007)

As seen in Exhibits 3-5 and 3-6, approximately 5,800 to 316,600 tons/year of D007-only nonwastewaters wastes are surface disposed. Today, the Agency is promulgating a UTS level of 0.60 mg/l for nonwastewater forms of D007 wastes. This standard is approximately 90 percent lower than the existing treatment standard of 5.0 mg/l TCLP. (See Exhibit 3-7.)

AFS suggested that the originally proposed UTS (0.86 mg/l) for chromium would be difficult to achieve for chromium TC wastes (D007) in foundry sands. AFS suggested that the record was not sufficient to address known interferences with stabilization technologies. However, no data were submitted to support or refute this. Additionally, no comments were received specifically on stabilization or other treatment capacity for D007 wastes.

In order to address commenters' concerns regarding the lack of stabilization data on TC metal wastes, the Agency conducted site visits to commercial hazardous wastes treatment facilities and collected additional stabilization treatment performance data that better characterized the diversity of metal wastes.[27] These waste streams contained multiple metals which would be representative of a characteristic waste with UHCs and significant concentrations of combination metals including: lead and cadmium, barium and lead, and chromium and antimony. Based on the waste characteristics that affect the performance (WCAPS) of the treatment technology, EPA believes that these wastes represent the most difficult to treat wastes. Therefore, the Agency believes that the performance data used to develop the UTS proposed in the second supplemental rule (62 *FR* 26041, May 12, 1997) adequately characterize the diversity among metal-bearing wastes including wastes containing multiple metals. However, the Agency has identified a technical error in the BDAT determination of the proposed chromium standard. (In applying the BDAT methodology for calculating the treatment standard, EPA failed to perform a "Z-score" outlier test.) The Agency corrected this error, re-calculated the chromium treatment standard, and is promulgating the UTS for chromium at 0.60 mg/l TCLP. This standard is more stringent than the proposed standard. Nevertheless, based on the treatment performance data described above, and given the availability of commercial treatment technologies such as stabilization and HTMR (see Chapter 2), D007-only wastes do not appear to present any particular capacity problems.

3.6.5 Lead (D008)

Approximately 77,900 to 168,300 tons of D008-only nonwastewater wastes are surface disposed

[27] Memoranda addressed to Anita Cummings from ICF: "Final Draft Trip Report for Mill Services," dated November 21, 1996; "Final Draft Trip Report for Rollins Highway 36 Facility," dated November 21, 1996; "Final Draft Site Visit Report for the September 11th Site Visit to GNB Battery Technologies Located in Frisco, Texas," dated December 6, 1996. These reports from site visits are available in the docket for today's rule.

each year. In today's rule, the Agency is promulgating a UTS of 0.75 mg/l for nonwastewaters of D008 wastes. This is a reduction of approximately 85 percent from the existing treatment standard of 5.0 mg/l TCLP, and is approximately two times higher than the treatment standard of 0.37 mg/l proposed in the original proposal (60 FR 43654, August, 22, 1995). (See Exhibit 3-7.)

In response to the original proposal, numerous persuasive comments on the proposed nonwastewater standard of 0.37 mg/l were received. As a result, the Agency in the Phase IV second supplemental proposed to change the D008 nonwastewater standard to 0.75 mg/l TCLP based on new BDAT stabilization data collected by the Agency (62 FR 26041, May 12, 1997) . The Agency felt that these data better reflected the diversity of metal waste streams and their treatment.

Numerous commenters concurred with the Agency's re-proposal.[28] However, other commenters, specifically those representing the various sectors of the secondary lead industry, argued that the proposed treatment standard for lead was not achievable. In particular, comments from BCI and the ABR argued that the new data developed by their association showed that no facility in the secondary lead industry could meet EPA's proposed treatment standard for lead. However, commenters failed to provide reliable and convincing data or information to persuade the Agency that stabilization cannot meet the re-proposed treatment standard of 0.75 mg/l TCLP for lead slags. Therefore, the Agency is today promulgating a treatment standard of 0.75 mg/l TCLP for D008 nonwastewaters.

These data on D008 wastes confirm EPA's assumption that the rule would primarily only require some modification to existing stabilization "formulations" to meet UTS. Given the little time such modifications would take and given the available capacity for D008 wastes (see Chapter 2), the Agency has determined that a capacity variance is not needed.

Foundry Sands Waste

AFS estimated that approximately 410,000 tons of D008 foundry sands are generated each year, and has stated that foundry metallic waste constituents and concentrations are highly variable. AFS also believes that the foundry sand and the emission control dust contain a significant amount of non-metallic constituents that differentiate foundry waste from K061 wastes, which EPA had used to establish high temperature metal recovery (HTMR) as the BDAT for some of the wastes. AFS believes that foundry sand differs from K061 in ways that precludes them from being treated similarly. These differences include: (1) K061 typically has a much higher concentration of recoverable heavy metals (primarily zinc); and (2) K061 does not have an extremely high sand content in its waste matrix. Emission control dust from foundries also differs from K061 because K061 typically has a much higher overall concentration of recoverable heavy metals (primarily zinc). Because of these critical differences, AFS does not believe that HTMR is available or practical for foundry wastes.

The Agency received additional data from several commenters in response to the original proposed rule. Based on these data the EPA believes that the potentially affected TC metal universe is limited to certain lead-bearing D008 hazardous wastes. The Agency estimates that there are 761 non-ferrous foundries that generate approximately 300,000 tons of hazardous foundry sands, and 9 firms owning 15 secondary lead smelters that generate approximately 198,000 tons of hazardous slags.

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[28] 62 *FR* 26041, May 12, 1997.

Data submitted by the foundry industry shows that the originally proposed UTS level for lead (0.37 mg/l) was achieved through stabilization, even when the treatment system (stabilization) was designed only to target the TC level and not the proposed UTS level. Several commercial treaters stated that stabilization can readily achieve the lead standards for foundry sands. These facts seem to indicate that foundry sands can be treated to the proposed treatment standards using stabilization and, thus, meeting the higher re-proposed UTS of 0.75 mg/l will be even less of a problem.

TC Lead Battery Slag

The Association of Battery Recyclers (ABR) and Battery Council International (BCI) estimates that the amount of lead slag requiring treatment is approximately 250,000 tons per year and ABR states that an estimated 260,000 tons per year of D008 slag will require treatment.

EPA also received comments that provided treatability data from the Environmental Technology Council (ETC) in response to the May 10, 1996 Notice of Data Availability (NODA) for the LDR Phase IV proposed rule. The data demonstrated that lead battery slags and sludges can be treated by stabilization to the UTS for lead and the underlying hazardous constituents (UHCs).

ETC's data for lead shows that out of 36 samples of stabilized slag, 29 (80.6%) achieved a TCLP result below the originally proposed UTS for lead of 0.37 mg/l. In all cases the treatment objective was to reduce leachability to below characteristic level, since UTS levels were not applicable at the time. Nevertheless, not only did the stabilization meet the characteristic levels for these samples, it also met the proposed UTS levels for all arsenic, barium, and nickel values. Eight of the nine (88.9%) cadmium values and six of the seven (85.7%) selenium values also met the proposed UTS of 0.37 mg/l. Based on these treatability data, ETC believes there can be no doubt regarding the ability to meet the UTS for this slag. Hence, it is unlikely that there will be any capacity shortfalls for TC metal wastes affected by today's rule once stabilization "formulations" are optimized to meet UTS.

3.6.6 Mercury (D009)

As seen in Exhibits 3-5 and 3-6, approximately 2,400 to 216,200 tons of D009-only nonwastewater wastes are surface disposed each year. EPA is promulgating a UTS level of 0.20 mg/l for the nonwastewater mercury retort residue subcategory and 0.025 mg/l for all other nonwastewater forms of D009. The UTS for mercury is based on the mercury standard developed from K071 waste treatment data. Mercury Recovery Services (MRS) provided data (see Appendix F) to show that the proposed UTS levels can be achieved and noted that MRS has the capability to provide mobile treatment units for treating mercury contaminated wastes. No other specific comments were received that would affect EPA's estimate of the required or available alternative treatment capacity for D009-only waste. Furthermore, as seen in Chapter 2, sufficient quantities of other treatment capacity are available for these wastes. Therefore, D009-only wastes do not appear to present any particular capacity problems.

3.6.7 Selenium (D010)

Approximately 8 to 84 tons/year of D010-only nonwastewater wastes are surface disposed. The Agency is promulgating today a UTS of 5.7 mg/l for nonwastewater forms of D010, which is significantly greater than the TC level of 1.0 mg/l.

In response to the original proposed rule (60 *FR* 43654, August 22, 1995), CWM and Rollins Environmental both submitted comments highlighting their inability to stabilize nonwastewater forms of D010 selenium-containing incineration ashes in the presence of other metals. These commenters stated that the proposed 0.16 mg/l TCLP for nonwastewater forms of D010 wastes was not routinely achievable utilizing "best operating practices". They also discussed selenium's unique pH/solubility curve, which is significantly different from other characteristic metals. Specifically, selenium's minimum solubility is at a neutral to mildly acidic pH, while it is highly soluble in the basic pH range. The other characteristic metals have a minimum solubility in the basic pH range, while their solubility increases in the neutral and acidic pH's. These commenters believe that this difference in solubilities creates a problem for treating wastes with a mixture of characteristic metals that includes selenium. In light of these different pH/solubility curves for selenium and other characteristic metals, CWM and Rollins believe that the treatment standard for selenium should be changed to make it more consistent with what is routinely achievable. Further, these commenters have provided treatment data on the stabilization of incineration ashes and soils to support their claims regarding the enhanced mobility of selenium under normal alkaline stabilization practices.

Based on these comments, the Agency revised and re-proposed a UTS of 5.7 mg/l in the Phase IV Second Supplemental (62 *FR* 26041, May 12, 1997). The majority of commenters supported the Agency's proposal and urged the Agency to adopt the 5.7 mg/l TCLP level. However, one commenter (Waste Management) maintains that the Agency should establish a "High Selenium Greater Than 200 ppm" subcategory for nonwastewaters, with a corresponding treatment standard of 10 mg/L TCLP. The commenter cited technical problems in achieving the proposed treatment standard level for highly contaminated selenium wastes. The commenter provided treatability testing data from a selenium waste stream which showed that 16 different treatment recipes were tested prior to finding one that would treat a selenium waste to below 5.7 mg/L TCLP. Data from three other generators of selenium waste suggest that untreated waste of between 465 and 1,064 mg/L set for selenium can be treated to between 2.5 and 45.6 mg/L TCLP.

When examined together, the data suggest, and commenters concur, that for the majority of selenium wastes the proposed selenium nonwastewater standard of 5.7 mg/l is appropriate. Therefore, the Agency is promulgating a treatment standard of 5.7 mg/l for nonwastewaters containing selenium. Notwithstanding this new treatment standard, however, the Agency acknowledges that a few high-level selenium waste streams for which data were submitted to EPA will, for the most part, be unable to be treated to achieve the 5.7 mg/l TCLP standard. Therefore, in a companion piece to today's rule, the Agency is requesting comment on a proposal to grant a site-specific treatability variance for one commenter (Waste Management) for the treatment of three D010 wastes containing greater than 450 ppm TCLP of selenium. Additional information on this issue can be found in a separate notice published in today's Federal Register.

Regarding capacity, the Agency believes that based on its analysis and comments received from the public, the new treatment standard for selenium of 5.7 mg/L TCLP is readily achievable by commercial treatment technologies and that adequate available treatment capacity exists for these wastes (see Chapter 2). Therefore, other than for the potentially unique waste streams discussed above, D010-only wastes do not appear to present any capacity problems.

3.6.8 Silver (D011)

Approximately 83 to 1,800 tons/year of D011-only nonwastewater wastes are surface disposed. Today, the Agency is promulgating the treatment standard for silver at 0.14 mg/l for nonwastewater forms of D011. This is approximately a 97 percent reduction in the existing treatment standard (i.e., 5 mg/l TCLP).

Several commenters (National Mining Association, Silver Council, DuPont Engineering, Chemical Manufacturers Association, Specialty Steel Industry of North America, and Kodak, among others) stated that the current silver LDR standard already minimizes threats to human health and the environment and, therefore, it should not be lowered. Specifically, the Silver Council and Kodak noted that silver was included in the TC list of metals solely based on the maximum contaminant level (MCL) for silver under the Safe Drinking Water Act, and because the Agency deleted the silver MCL (56 *FR* 3573) and is further considering deleting silver from the TC list, any new standards for silver should be withheld until the Office of Solid Waste has completed its current review of silver's inclusion on the TC list.

In response to the Phase IV LDR proposed rules, the Agency did not receive specific treatment capacity data on D011 wastes. Based on the capacity analysis conducted by the Agency (see Chapter 2), adequate treatment capacity exists for these wastes. Therefore, D011-only wastes do not appear to pose any capacity problems.

3.6.9 TC Metal-only Mixtures

As seen in Exhibits 3-5 and 3-6, between approximately 70,000 and 105,000 tons of TC metal-only nonwastewater mixtures are land disposed, which represents about 8 percent of the upper-bound estimate and 11 percent of the lower-bound estimate of total surface-disposed TC meta-only wastes, respectively. As stated in Section 3.3, the quantity of Phase IV TC metal waste that might require alternative treatment is likely below the lower-bound estimate. Furthermore, the quantity that is eligible for a capacity variance (i.e., the newly identified waste) is expected to be even smaller. Thus, mixtures that are discussed in Section 3.3 as possibly resulting in treatment difficulties (but not necessarily capacity problems) and that are also eligible for a capacity variance likely will be less than 70,000 tons. Nevertheless, as discussed below, several combinations of potentially problematic mixtures were identified that are routinely generated in a number of different industries.

AFS submitted comments relating to foundry sands that contain up to 5 to 6 percent lead in addition to cadmium, chromium, and selenium. ABR submitted comments regarding secondary lead smelters that generate a slag containing lead and other metals from the recycling of batteries. Mixtures with combinations of constituents that include arsenic, selenium, chromium, and cadmium probably have the greatest potential to affect capacity based on the fact that CWM and Rollins have found mixed waste streams with these constituents difficult to treat. However, ETC has been successful treating mixtures containing these constituents to UTS and believes that the problem could be totally resolved once specific stabilization "formulations" are developed to meet UTS. The Agency contacted several commercial treatment facilities to collect data to estimate the time required to comply with the proposed treatment standards (see Section 2.1).

Based on the information collected from these facilities, EPA believes that the necessary changes to the treatment systems to comply with the proposed treatment standards could be made in a relatively short amount of time (less than 90 days). Therefore, the Agency does not anticipate any capacity problems for wastes containing TC metal mixtures.

3.6.10 Underlying Hazardous Constituents (UHCs)

Two general categories of TC metal wastes with UHCs may require alternative treatment as a result of Phase IV: TC metal wastes with metal UHCs and TC metal wastes with organic UHCs. The first type of waste is virtually indistinguishable from the wastes discussed previously, especially those in Section 3.6.9, and thus are not addressed further here. The second type, organometallic TC metal-only wastes, are potentially more problematic because of the additional treatment that sometimes is needed. EPA estimates that approximately 32,441 tons (29,197 metric tons) of organometallic wastes are generated every year.[29] This estimate is within the range of 8,820 tons/year and 51,812 tons/year, which was obtained by summing the lower- and upper-bound estimates for all surface-disposed organic TC metal wastes (see Exhibits 3-5 and 3-6). As discussed in Section 3.3, the Agency believes that most of these wastes are being stabilized to treat metals and other inorganic constituents and then disposed in Subtitle D units. EPA assumes that new waste management practices, as a result of the Phase IV rule, will involve thermal treatment of the wastes to remove the organics, followed by stabilization and subsequent Subtitle D disposal. Not all of the organometallic TC metal wastes will require such additional treatment because of Phase IV, however, because the organic constituents likely already are causing treaters to conduct thermal or other treatment prior to stabilization due to the problems that organics can have on the stabilization process.

Nevertheless, several commenters expressed concern regarding the treatability of all UHCs in TC metal wastes. The TDJ Group noted that it is not clear whether the Agency fully considered the feasibility of achieving the UTS for all UHCs and, in addition, whether such requirements would be a prudent use of waste management resources. The Association of Battery Recyclers stated that the UHCs in the lead battery slag cannot be treated to the proposed UTS using the stabilization technology. However, no data were submitted to support these comments.

Some commenters had stated that the presence of organic UHCs interfere with the stabilization process and, therefore, the TC metals in these wastes could not be treated to the proposed treatment standards. As discussed above, EPA believes that such interference already is being addressed, at least to some extent. One commenter, CWM, stated that new RCRA Subpart CC rules (i.e., for organic air emissions at treatment facilities) have to be met when considering the treatment of TC metal wastes with organic UHCs.

However, the Agency notes that facilities that would be conducting such treatment already would be meeting such requirements. The Agency contacted several commercial treatment facilities to obtain information on the treatability of TC metal wastes with organic UHCs (see Section 2.1). Several facilities indicated that organic UHCs can be readily treated to the UTS. For example, a representative of one CWM facility stated that 75 percent of the wastes managed by CWM are already incinerated to meet the organic LDRs prior to metals treatment. The Agency also notes that, as discussed in Chapter 2, approximately

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[29] USEPA, *Regulatory Impact Analyses: Phase IV Land Disposal Restrictions - TC Organometallic Wastes (Preliminary Draft Report)*, December 1, 1997, Figures 1 and 2.

981,500 tons/year of combustion capacity is available. This capacity can be utilized for any organometallic wastes that still require pretreatment by combustion to meet Phase IV LDRs. In addition, as discussed in Section 3.4, other types of thermal treatment (e.g., thermal desorption) may be used for pretreatment of organometallic wastes.

In summary, the Agency believes that TC metal wastes containing organic UHCs are amenable to thermal treatment prior to stabilization, and since adequate thermal treatment (and probably some stabilization and other technologies) capacity is available for organics, treatment of TC metal wastes containing organic UHCs are expected to pose few problems in terms of capacity (except, perhaps, for relatively minor logistics and timing issues).

3.7 SUMMARY OF RESULTS

As discussed above, EPA estimates that approximately 0.7 to 1.3 million tons (0.64 to 1.2 million metric tons) of TC metal wastes are surface disposed per year. Because many of these wastes are believed to already be meeting the new treatment standards, or will otherwise undergo waste segregation and minimization prior to the LDRs, a much smaller quantity likely would require alternative treatment as a result of promulgation of today's rule. Furthermore, approximately 260,000 tons/year[30] of these wastes are newly identified TC metal wastes (i.e., wastes that are not or would not be hazardous using the EP), while the remainder are EP hazardous TC metal wastes. As discussed in Sections 3.3, 3.4, and 3.6, both types of waste are expected to primarily only require optimization of existing stabilization formulations and systems. For example, the majority of the newly identified TC metal wastes are currently being treated to TC levels because it is generally more economical to treat the TC metal wastes to TC levels and dispose the waste in Subtitle D landfills rather than to manage the waste untreated in Subtitle C landfills. Such treatment already meets, or substantially meets, the new treatment standards. Also, for arsenic and mercury, the UTS are equivalent to the TC levels and therefore will require no changes in treatment capacity (except to the extent treatment system optimization is needed to meet UTS for UHCs). Nevertheless, for any newly identified wastes that are currently being land disposed without treatment or for any new treatment residues resulting from thermal treatment of TC metal wastes containing organic UHCs, as noted in Chapter 2, at least several million tons/year of commercial stabilization and other capacity is available. Based on these results, the Agency is not granting a national capacity variance for the newly identified TC metal wastes, including soil and debris, covered by today's rule (beyond the 90 days allowed prior to the effective date of rule).

Regarding the EP hazardous TC metal wastes (i.e., the TC metal wastes that are not newly identified), the Agency examined data provided by commenters and obtained during site visits to commercial treatment facilities (as discussed in Chapter 2), and believes that the proposed treatment standards are routinely achievable using current treatment technologies such as stabilization. Also, some capacity for vitrification and HTMR also exists to treat the otherwise difficult-to-treat TC metal wastes, and sufficient combustion capacity exists to pre-treat TC metal wastes that contain organic UHCs (see Chapter 2). In addition, the majority of the TC metal wastes are already being treated to the TC and, to a large extent, UTS levels. Thus, very little time is needed for treaters to implement modifications (e.g., developing new waste-

[30] Based on data (primarily lead slag) provided by the commenters in response to the original proposed rule. No data were provided on other newly identified TC metal wastes, and their quantities are assumed to be much lower.

specific stabilization formulations) to their treatment systems.

As discussed in Section 3.5, the Agency recognizes the lack of available capacity for mixed radioactive TC metal wastes, including soil and debris, and thus is granting a two-year national capacity variance.

The Agency notes that if generators of newly identified wastes (i.e., wastes that do not fail the EP test, and, consequently, were not part of the Third Third LDR Rule) cannot obtain adequate treatment for specific wastes, then the generators of these wastes may apply for a capacity variance extension per 40 CFR 268.5 on a case-by-case basis. Wastes regulated in the Third Third LDR Rule (i.e., wastes that fail the EP test) are not eligible for capacity variances because the extension provided in that rulemaking has already expired. Furthermore, if treaters of TC metal wastes (i.e., newly identified wastes as well as those wastes regulated in the Third Third Rule) have difficulties in treating specific wastes, the treaters may apply for a treatability variance under 40 CFR 268.44. Finally, for contaminated soil, a new site-specific, risk-based variance for the technology-based alternative soil treatment standards. This variance can be used when treatment to concentrations of hazardous constituents that are greater (i.e., higher) than those specified in the alternative soil treatment standards is shown to minimize short- and long-term threats to human health and the environment. In this way, on a case-by-case basis, risk-based LDR treatment standards approved through a variance process could "cap" the technology-based treatment standards.

CHAPTER 4
CAPACITY ANALYSIS FOR THE NEWLY IDENTIFIED MINERAL PROCESSING WASTES

This chapter describes the capacity analysis for the newly identified mineral processing wastes covered by today's Phase IV LDR Final Rule. The purpose of this analysis is to estimate the demand for commercial treatment/recovery for the newly identified mineral processing wastes and to determine the effective date of the Phase IV LDRs for these waste streams. This chapter is organized into the following six sections:

- **Section 4.1: Regulatory Background**, provides the regulatory background and identifies the universe of mineral processing wastes covered by this rule;
- **Section 4.2: Data Sources**, describes the data sources used for the capacity analysis;
- **Section 4.3: Methodology and Assumptions**, discusses the analysis of required capacity for the newly identified mineral processing wastes;
- **Section 4.4: Soil and Debris Contaminated with Newly Identified Mineral Processing Wastes**, discusses soil and debris contaminated with newly identified mineral processing wastes;
- **Section 4.5: Mixed RCRA/Radioactive Wastes**, addresses mixed radioactive mineral processing wastes; and
- **Section 4.6: Summary of Results**, summarizes the results of the capacity analysis and provides a discussion of the capacity variance decisions.

4.1 REGULATORY BACKGROUND

Under section 8002 of the 1980 Amendments to RCRA, commonly referred to as the Bevill Amendment, wastes from extraction, beneficiation, and mineral processing operations were excluded from regulation as hazardous wastes under Subtitle C pending further study. Mineral processing wastes were considered unique by Congress because they are often generated in large volumes and thought to be of low hazard and less amenable to standard treatment technologies than other Subtitle C wastes. The Bevill Amendment required the Agency to present its findings in a Report to Congress and to issue a regulatory determination based on this study.

In order to comply with the Bevill Amendment, EPA decided to conduct two separate studies. The first study addressed wastes from extraction and beneficiation operations. The Agency completed its study on extraction and beneficiation wastes in 1985 and issued a regulatory determination in 1986 removing these wastes from Subtitle C regulation. The second study addressed the mineral processing wastes. Several Court challenges to EPA's regulatory approach delayed completion of the mineral processing study and limited the study to high-volume, low-hazard wastes referred to as "special wastes".

The Agency established the criteria for what constitutes a "special waste" in a September 1, 1989 rulemaking (54 *FR* 36592) and permanently removed all but 25 mineral processing wastes from the Bevill exclusion. Five more wastes were removed from the exclusion in a second rulemaking promulgated on

January 23, 1990 (55 *FR* 2322). All waste streams removed from the Bevill exclusion (i.e., "de-Bevilled" wastes) and subsequently found to exhibit any of the RCRA hazardous characteristics (e.g., corrosivity, ignitability, reactivity, or toxicity) became subject to RCRA Subtitle C requirements.

In addition to the above wastes, five wastes (K064-K066, K090-K091) generated from primary metal smelters were listed as hazardous wastes on May 19, 1980 (45 *FR* 33112) and on July 16, 1980 (45 *FR* 47832).[1] EPA suspended the listings for these smelter wastes on November 12, 1980 (45 *FR* 76618) and on January 16, 1981, because these wastes appeared to be within the scope of the Bevill exclusion.[2] During 1984, several environmental organizations challenged EPA's failure to comply with the terms of the Bevill Amendment. [Concerned Citizens of Adamstown v. EPA, Civ. No. 84-3041 (D.D.C.)] As a result, the court ordered EPA to take action on a planned rulemaking reinterpreting the scope of the mining waste exclusion. Under court order, EPA proposed to narrow the scope of the exclusion by relisting the five metal smelting wastes, among other things (50 *FR* 40292, October 2, 1985). On October 9, 1986, however, the Agency announced that it was withdrawing its reinterpretation due to definitional problems EPA faced in determining how to group and classify the wastes (51 *FR* 36233). This withdrawal of the proposed reinterpretation effectively continued the suspension of the five smelter waste listings. This action was also challenged by environmental organizations [EDF v. EPA, No. 86-1584 (D.C. Cir.)]. The Court directed EPA to relist the smelter wastes by August 31, 1988. Therefore, EPA reinstated the hazardous waste listings for these five wastes associated with smelting operations. The relisting was subsequently challenged by the American Mining Congress on the grounds that EPA failed to give an adequate reasoned explanation for its decision to relist the wastes [AMC et al. v. U.S. EPA, Nos. 88-1835 et al. (D.C. Cir.)]. During July 1990, the court remanded the five smelting wastes for further consideration and explanation by the Agency with respect to the basis for the relisting.

In today's rulemaking, the Agency is not going to re-list the five wastes (K064-K066, K090-K091) generated from primary metal smelters as hazardous. The Agency will, instead, regulate these wastes according to their hazardous characteristics. Thus, the regulatory status of these wastes does not differ from the "de-Bevilled" wastes and, therefore, these wastes are included in the present capacity analysis.

In various Phase IV LDR proposed rules (61 *FR* 2338, January 25, 1996; 61 *FR* 21418, May 10, 1996; 62 *FR* 26041, May 12, 1997), EPA proposed to apply the UTS to the newly identified mineral processing wastes (i.e., "de-Bevilled" wastes). Today's rule establishes treatment standards for these mineral processing wastes.

Finally, as discussed previously in Section 3.1, the Land Disposal Program Flexibility Act of 1996

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[1] A total of eight waste streams generated from metal smelting operations were listed. In 1985, however, EPA determined that K067 and K068 do not meet the current definitions of solid waste; therefore, these wastes are no longer listed (50 *FR* 40296, October 2, 1985). In addition, K088, which was relisted in 1988 and not affected by the court ruling, was addressed in the Phase III rule (60 *FR* 11701, March 2, 1995).

[2] On October 21, 1980, Congress enacted a law that included various amendments to RCRA. Section 7 of these amendments (the "Bevill Amendment") amended §3001 of RCRA to exclude "solid waste from the extraction, beneficiation, and processing of ores and minerals" from regulation as hazardous wastes under Subtitle C of RCRA pending the completion of studies of these wastes to determine what adverse effects they had on human health and the environment, if any.

(LDPFA) provides an exemption from treatment of UHCs to UTS for land-disposed hazardous characteristic wastes if the wastes are decharacterized and managed by Clean Water Act (CWA) or equivalent systems. The hazardous waste characteristic can be removed by any means, including dilution or other deactivation through aggregation of different waste streams preceding land disposal. Thus, newly identified mineral processing wastes that are managed in CWA or equivalent systems, which constitute practically all of the characteristic wastewaters (as determined during the Phase III LDR capacity analysis; 61 *FR* 15565, April 8, 1996) only have to meet characteristic levels prior to land disposal, a practice already required by RCRA Subtitle C permitting requirements (40 CFR Parts 264 and 265).

4.2 DATA SOURCES

EPA has collected considerable information on the mineral processing industry, including data on waste volumes generated, waste characteristics, and waste management practices. These data collection efforts have included formal and informal surveys, site visits, sampling, literature searches, and analyses of public comments to proposed rulemakings. As a result of these data collection efforts, the Agency has developed a large body of data on mineral processing industry wastes and management practices.[3] The following sections describe the primary data sources used to develop the mineral processing capacity data set, which was used to perform the capacity analysis.

4.2.1 ANPRM Comments

EPA received eleven comments to the October 24, 1991 Advanced Notice of Proposed Rulemaking (ANPRM) (56 *FR* 55160) from trade associations and mineral producers relevant to de-Bevilled mineral processing wastes. Their comments addressed such issues as treatment standards, waste characteristics, management practices, and available and required capacity. EPA used the characterization data provided to supplement the characterization information the Agency already had on these wastes. The pertinent information on available and required capacity and waste management are discussed in the applicable sections below.

4.2.2 National Survey of Solid Waste from Mineral Processing Facilities (RTI Survey)

In February 1989, EPA administered a written questionnaire to the operators of all facilities that, to the Agency's knowledge, generated one or more of the ore and mineral processing waste streams that the Agency was considering retaining within the Bevill exclusion at that time. This survey, known as the RTI Survey (for Research Triangle Institute, who conducted the survey), included approximately 300 questions, and was distributed to the operators of about 200 mineral processing facilities. Despite certain limitations (described below), the RTI Survey represents the single most comprehensive source of available data on mineral processing waste generation and management.

[3] For additional information, see USEPA's *Identification and Description of Mineral Processing Commodity Sectors and Waste Streams - Interim Final Document*, Office of Solid Waste, March 15, 1995.

It should be noted that the RTI Survey was designed and conducted before the regulatory definition of "special waste" was finalized, and only a high volume criterion was used as a basis for inclusion. Forty-two of the wastes included in the RTI Survey have since been removed from the Bevill exclusion, and are expected to be hazardous. The Survey, however, did not include many low-volume mineral processing waste streams which comprise a significant proportion of the potentially hazardous wastes and which could be important for the capacity analysis. Available information on these waste streams is much less complete. For these wastes, EPA generally does not have recent facility-specific data on waste quantities generated.

The RTI Survey was designed to elicit information on operational characteristics of individual facilities, on sources and quantities of wastes, and on current and alternative waste management practices. Several questions requested data on waste characteristics. In each of these questions, respondents were given a list of 82 constituents and asked to report the average total concentration of up to 15 of the constituents for each waste stream (defined by the processing unit from which the waste stream was generated). Respondents were allowed to base their answers either on test results or on general knowledge of the stream in question and were not required to conduct additional testing or to document the basis for their answer. The RTI Survey consisted of nine sections, of which four sections had questions pertaining to waste characteristics. These four sections are described below:

- Section 2 - Processing units that generate a special waste. The questions in Section 2 of the RTI Survey focused on individual units in the production process. Facilities were required to complete a Section 2 question set for each special waste generated. The RTI Survey specifically requested information about 47 special wastes, although some facilities provided information about additional wastes not specifically identified in the Survey. Pertinent questions requested the name of the waste stream, the name of the processing unit generating that waste, and the characteristics of that waste stream.

- Section 3 - Processing units that receive a special waste. Section 3 asked questions about on-site operating units that utilized one or more special wastes as feedstocks, and produced final or intermediate products (i.e., materials of value). Section 3 asked respondents to identify the processing unit and as many as eight of the material inputs (special waste or not) to the unit and to list any (up to six) residues generated by the processing unit. The names of residues listed in actual survey responses varied by facility. Even facilities in the same industry sector with similar operations may have had widely differing residues due to differences in nomenclature and in interpretation of the particular question, making it difficult to identify similar waste streams. Questions in Section 3 asked for the composition of "the liquid residue" and "the solid residue" generated by the unit, but the responses often could not be traced to a precise waste stream.

- Section 4 - Wastewater treatment plants that receive a special waste. Pertinent questions in Section 4 asked facilities to identify the wastewater treatment plant in question, list up to ten inflows to the plant (special waste or not), and give characteristics of the "liquid outflows" and of the "sludge/solid outflows".

- Section 5 - Surface impoundments that receive a special waste. The format of Section 5 is similar to Section 4. Facilities were asked to identify the surface impoundment, list inflows (special waste or not), and provide characteristics of "liquids removed from the surface impoundment" and "sludge/solids removed from the surface impoundment." In many cases the inflow information indicated that special wastes were combined with other wastes (sometimes other special wastes), making it difficult to categorize the data as applying to an individual special waste stream. In addition, it was often difficult to ascertain whether the surface impoundment functioned as a holding pond for untreated wastes, a holding pond for treated wastes, or a treatment pond. Again, variations from facility to facility made it difficult to draw general conclusions about the inputs and outputs of these units.

4.2.3 Comments on Bevill Rules

EPA proposed, re-proposed, and promulgated several rules related to the 1980 Bevill Amendment. These regulatory actions defined the scope of the Bevill exemption and ultimately determined which waste streams would become subject to Subtitle C regulation. In response to the various proposals and specific requests for information on waste generation and management, public commenters submitted data for specific waste streams for the Agency's use in developing final regulatory actions. For some sectors, these data are the only available information on waste generation used for the present capacity analysis.

4.2.4 EPA Sampling Data

EPA's Offices of Solid Waste (OSW) and Research and Development (ORD) both conducted sampling and analysis efforts. EPA Sampling Data includes analytical data on samples obtained and analyzed by EPA in 1989.

OSW sampled 36 mineral processing facilities in 16 industry sectors as part of its effort to define the scope of the Bevill exclusion. Samples were collected for 42 waste streams at the point of waste generation from at least two facilities in each sector (except for waste types that were only generated by a single facility). In general, the wastes also were sampled as managed (e.g., after treatment or disposal). Each sample was analyzed using the extraction procedure (EP) and the synthetic precipitation leaching procedure (SPLP)[4] tests and also analyzed for total concentration. In some cases, wastes were analyzed for various organics, pH, and radioactivity.

ORD collected data to support a series of reports characterizing waste streams and facilities in eight industry sectors. The types of data compiled from this effort varied with the individual report, but in most cases they were similar to that collected by OSW.

4.2.5 RCRA §3007 Data (1989)

In 1989, EPA issued a formal request, under authority of RCRA §3007, requesting all mineral processing facilities to submit any currently available information on the characteristics of the special mineral processing wastes generated at the facility. EPA requested these data as part of an effort to augment existing EPA waste characterization data and to give the facilities affected by the Mining Waste exclusion an

[4] The Synthetic Precipitation Leaching Procedure (SPLP, Method 1312) is the basis of one of two low hazard criteria used to screen waste eligibility under the Bevill exclusion. The second criterion is pH.

opportunity for meaningful input into the Agency's evaluation of these wastes. Operators were notified that failure to respond to the information request might lead to penalties under RCRA §3008(a).

The §3007 letter specifically requested all existing data collected since January 1, 1984 on the physical and chemical composition, radioactivity, and pH of candidate wastes. Existing data from extraction-type tests, particularly from SPLP and EP toxicity leach tests, were also requested. In some cases, facility operators had few or none of the requested data, or had reason to believe that existing data were not representative of wastes as currently generated. In these cases, facility operators were allowed to voluntarily collect new data through sampling and analysis.

EPA received responses to its data request from 228 facilities in 22 industry sectors. Facility operators responded in a number of different ways, up to and including submitting hundreds of pages of data from weekly or daily monitoring. Although the §3007 letter requested that all data submitted indicate the type of waste to which they apply, and the analytical method(s) used, this instruction was not always followed. In some cases, the identity of the waste stream and/or the testing method used was not clear.

4.2.6 Data from Effluent Guidelines Development Documents

EPA's Office of Water collected data, under section 308 of the Clean Water Act (CWA), in support of the effluent guidelines and pretreatment standards development process. These data are presented in the effluent limitations guidelines and standards documents for each industry. The mineral processing characterization data set compiled by EPA includes data from these industry specific documents.

4.2.7 RCRA §3007 Data (1994)

In December 1994, EPA issued a formal request under the authority of RCRA §3007, requesting ASARCO to submit currently available information on the mineral processing waste generation, composition, management, and treatment practices. ASARCO submitted the requested information for seven facilities as Confidential Business Information (CBI). These data are used in the present analysis, but masked to maintain confidentiality.

4.2.8 Comments to the Phase IV LDR Proposed Rules

In various Phase IV LDR proposed rules (61 *FR* 2338, January 25, 1996; 61 *FR* 21418, May 10, 1996; and 62 *FR* 26041, May 12, 1997), EPA proposed to apply the UTS to the newly identified mineral processing wastes (i.e., de-Bevilled mineral processing wastes that exhibit a characteristic and are not excluded from being solid wastes due to recycling). The Agency requested the public to provide data on the required and available capacity for wastes covered by the Phase IV LDR rule.

In response to the Phase IV LDR proposals, FMC Corporation submitted data on elemental phosphorus mineral processing wastes generated at their Pocatello, Idaho facility. The commenter stated that these waste streams pose unique treatability problems (e.g., due to the presence of naturally occurring radioactive materials) and requested a two-year national capacity variance for these waste streams. On November 10, 1997, the Agency published a Notice of Data Availability (NODA) in which it made available to the public new data submitted by FMC Corporation and requested comments on these data and a two-year national capacity variance on these wastes.

In addition to FMC Corporation, several other commenters provided capacity information to EPA.

All applicable comments and data received in response to the various Phase IV LDR proposals are included in the capacity analysis described in this document.

4.2.9 Other Data Sources

Various other rulemakings and reports were consulted for this study, including the sources listed below:

- Bevill Mineral Processing Reinterpretation Rule (54 *FR* 36592, September 1, 1989) and Background Document;
- Mining Waste Exclusion Proposed Rule (54 *FR* 39298, September 25, 1989);
- Mining Waste Exclusion Final Rule (55 *FR* 2322, January 23, 1990);
- PEI Associates, *Overview of Solid Waste Generation, Management, and Chemical Characteristics: Primary Antimony, Magnesium, Tin and Titanium Smelting and Refining Industries*, December, 1984;
- Draft Report to Congress, *Solid Wastes from Selected Metallic Ore Processing Operations*, July 15, 1988;
- Radian Corporation, *Overview of Solid Waste Generation, Management, and Chemical Characteristics in the Bauxite Refining and Primary Aluminum Industry*, November, 1984; and
- EPA Office of Solid Waste, Waste Identification Branch, *Investigative Study to Determine Viable Options to the Remand of Mining and Smelting Wastes* (unpublished draft), 1992.

4.3 METHODOLOGY AND ASSUMPTIONS

This section provides an overall description of the methodology and assumptions used to estimate the quantities of newly identified mineral processing wastes that will require alternative treatment as a result of the Phase IV LDR rule. For a detailed discussion on the methodology and assumptions used to estimate these quantities, refer to USEPA, *Application of the Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes: Regulatory Impact Analysis*, April 1998 (RIA).

EPA used several data sources (described in Section 4.2) to characterize the universe of wastes affected by the Phase IV LDR Final Rule. Exhibit 4-1 lists the potentially affected waste streams by mineral processing sector, shows the estimated quantity generated, and identifies whether the constituents exceed the TC metal or characteristic regulatory levels (information provided in this exhibit is based on baseline data used in the RIA). The data provided in Exhibit 4-1 are based on the following conventions:

Waste Quantities:

- The waste quantity generated includes both estimated and reported values. Estimated values are provided as a range (minimum, expected, and maximum). Reported values are point estimates (and therefore the same value is used for minimum, expected, and maximum). These generated quantities may be recycled and/or disposed.

Hazardous Characteristics:

- "Y" means EPA has actual analytical data demonstrating that the waste exhibits one or more of the RCRA hazardous characteristics.
- "Y?" means that EPA, based on professional judgment, believes that the waste may exhibit one or more of the RCRA hazardous characteristics.
- "N" indicates that the waste probably does not exhibit one or more of the RCRA hazardous characteristics.
- "N?" indicates that insufficient data are available to analyze. Based on general knowledge of the industry, however, EPA believes that the waste probably does not exhibit one or more of the RCRA hazardous characteristics.

Recycling Status:

- "Y" means that EPA has information indicating that the waste stream is fully recycled.
- "Y?" means that EPA, based on professional judgment, believes that the waste stream could be fully recycled.
- "YS" means that EPA has information to show that the waste stream is partially recycled.
- "YS?" means that EPA has information to believe that the waste stream could be partially recycled.

Waste Form:

- Key for Waste Form: 1 = waste with less than 1 percent total suspended solids (TSS) (wastewater); 2 = waste with 1 to 10 percent TSS (liquid nonwastewater); 3 = waste with greater than 10 percent TSS (nonwastewater).

EXHIBIT 4-1
MINERAL PROCESSING WASTES BY COMMODITY SECTOR

Commodity	Waste Stream	Reported Generation (1000mt/yr)	Est./Reported Generation (1000mt/yr)			Number of Facilities with Process	TC Metals								Corr	Ignit	Rctv	Current Recycle	Waste Form
			Min	Avg.	Max		As	Ba	Cd	Cr	Pb	Hg	Se	Ag					
Alumina and Aluminum	Cast house dust	19	19	19	19	23			Y			Y			N?	N?	N?	Y?	3
	Electrolysis waste	58	58	58	58	23					Y?				N?	N?	N?	Y?	3
Antimony	Autoclave filtrate	NA	0.32	27	54	6	Y?		Y?		Y?	Y?			Y?	N?	N?	YS?	1
	Stripped anolyte solids	0.19	0.19	0.19	0.19	2	Y?								N?	N?	N?	Y	3
	Slag and furnace residue	21	21	21	21	6					Y?				N?	N?	N?	N	3
Beryllium	Chip treatment wastewater	NA	0.2	100	2000	2				Y?					N?	N?	N?	YS?	1
	Spent barren filtrate	55	55	55	55	1							Y		N?	N?	N?	YS	1
	Filtration discard	NA	0.2	45	90	2					Y?				N?	N?	N?	N	3
Bismuth	Alloy residues	NA	0.1	3	6	1					Y?				N?	N?	N?	N	3
	Spent caustic soda	NA	0.1	6.1	12	1					Y?				N?	N?	N?	Y?	2
	Electrolytic slimes	NA	0	0.02	0.2	1					Y?				N?	N?	N?	Y?	3
	Lead and zinc chlorides	NA	0.1	3	6	1					Y?				N?	N?	N?	N	3
	Metal chloride residues	3	3	3	3	1					Y?				N?	N?	N?	N	3
	Slag	NA	0.1	1	10	1					Y?				N?	N?	N?	N	3
	Spent electrolyte	NA	0.1	6.1	12	1					Y?				N?	N?	N?	N	2
	Spent soda solution	NA	0.1	6.1	12	1					Y?				Y?	N?	N?	Y?	1
	Waste acid solutions	NA	0.1	6.1	12	1									Y?	N?	N?	N	1
	Waste acids	NA	0	0.1	0.2	1									Y?	N?	N?	YS?	1
Cadmium	Caustic washwater	NA	0.19	1.9	19	2			Y?						Y?	N?	N?	Y?	1
	Copper and lead sulfate filter cakes	NA	0.19	1.9	19	2			Y?		Y?				N?	N?	N?	Y?	3
	Copper removal filter cake	NA	0.19	1.9	19	2			Y?						N?	N?	N?	Y?	3
	Iron containing impurities	NA	0.19	1.9	19	2			Y?						N?	N?	N?	N	3
	Spent leach solution	NA	0.19	1.9	19	2	Y?		Y?		Y?				Y?	N?	N?	Y?	2
	Lead sulfate waste	NA	0.19	1.9	19	2			Y?		Y?				N?	N?	N?	Y?	3
	Post-leach filter cake	NA	0.19	1.9	19	2			Y?						N?	N?	N?	N	3
	Spent purification solution	NA	0.19	1.9	19	2			Y?						Y?	N?	N?	N	1
	Scrubber wastewater	NA	0.19	1.9	19	2			Y?						Y?	N?	N?	Y?	1
	Spent electrolyte	NA	0.19	1.9	19	2			Y?						Y?	N?	N?	N	2
	Zinc precipitates	NA	0.19	1.9	19	2			Y?						N?	N?	N?	Y?	3
Calcium	Dust with quicklime	0.04	0.04	0.04	0.04	1									Y?	N?	N?	Y	3

EXHIBIT 4-1 (continued)
MINERAL PROCESSING WASTES BY COMMODITY SECTOR

Commodity	Waste Stream	Reported Generation (1000mt/yr)	Est./Reported Generation (1000mt/yr)			Number of Facilities with Process	TC Metals								Corr	Ignit	Rctv	Current Recycle	Waste Form
			Min	Avg.	Max		As	Ba	Cd	Cr	Pb	Hg	Se	Ag					
Chromium and Ferrochromium	Electrostatic precipitator (ESP) dust	3	3	3	3	1				Y			Y		N?	N?	N?	YS	3
	Gas control tower (GCT) sludge	NA	0.03	0.3	3	1				Y?					N?	N?	N?	Y	3
Coal Gas	Multiple effects evaporator concentrate	NA	0	0	65	1	Y						Y		N?	N?	N?	YS	2
Copper	Acid plant blowdown	5300	5300	5300	5300	10	Y		Y	Y	Y	Y	Y	Y	Y	N?	N?	YS	2
	Wastewater treatment plant (WWTP) sludge	6	6	6	6	10			Y?		Y?				N?	N?	N?	YS	3
	Spent Furnace Brick	3	3	3	3	10				Y					N?	N?	N?	Y?	3
Elemental Phosphorus	Andersen Filter Media	0.46	0.46	0.46	0.46	2			Y						N?	N?	N?	N	3
	Precipitator slurry	160	160	160	160	2			Y?						N?	Y	Y	YS	2
	Non-Hazardous Slurry Assurance Precipitator (NOSAP) slurry	160	160	160	160	2									N?	N?	Y	N	2
	Phossy Water	670	670	670	670	2			Y?						N?	Y	Y	YS	2
	Furnace scrubber blowdown	410	410	410	410	2			Y						Y	N?	N?	Y	1
	Furnace Building Washdown	700	700	700	700	2			Y						N?	N?	N?	Y	1
Fluorspar and Hydrofluoric Acid	Off-spec fluosilicic acid	NA	0	15	44	3									Y?	N?	N?	YS	1
Germanium	Waste acid wash and rinse water	NA	0.4	2.2	4	4	Y?		Y?	Y?	Y?		Y?	Y?	Y?	N?	N?	YS?	1
	Chlorinator wet air pollution control sludge	NA	0.01	0.21	0.4	4	Y?		Y?	Y?	Y?		Y?	Y?	N?	N?	N?	YS?	3
	Hydrolysis filtrate	NA	0.01	0.21	0.4	4	Y?		Y?	Y?	Y?		Y?	Y?	N?	N?	N?	N	3
	Leach residues	0.01	0.01	0.01	0.01	3			Y?		Y?				N?	N?	N?	N	3
	Spent acid/leachate	NA	0.4	2.2	4	4	Y?				Y?				Y?	N?	N?	YS?	1
	Waste still liquor	NA	0.01	0.21	0.4	4	Y?		Y?	Y?	Y?		Y?	Y?	N?	Y?	N?	N	3
Lead	Acid plant sludge	14	14	14	14	3									Y?	N?	N?	Y?	3
	Baghouse incinerator ash	NA	0.3	3	30	3			Y		Y				N?	N?	N?	N	3
	Slurried air pollution control device (APC) Dust	7	7	7	7	3			Y		Y				N?	N?	N?	Y	3
	Solid residues	0.4	0.4	0.4	0.4	3					Y?				N?	N?	N?	Y?	3
	Spent furnace brick	1	1	1	1	3					Y				N?	N?	N?	Y	3
	Stockpiled miscellaneous plant waste	NA	0.3	67	130	3			Y		Y				N?	N?	N?	YS?	3
	WWTP liquid effluent	2600	2600	2600	2600	3					Y?				Y?	N?	N?	Y	1

EXHIBIT 4-1 (continued) MINERAL PROCESSING WASTES BY COMMODITY SECTOR

Commodity	Waste Stream	Reported Generation (1000mt/yr)	Est./Reported Generation (1000mt/yr)			Number of Facilities with Process	TC Metals								Corr	Ignit	Rctv	Current Recycle	Waste Form
			Min	Avg.	Max		As	Ba	Cd	Cr	Pb	Hg	Se	Ag					
Magnesium and Magnesia from Brines	Cast house dust	NA	0.08	0.76	7.6	1		Y?							N?	N?	N?	Y?	3
	Smut	26	26	26	26	2		Y							N?	N?	N?	N	3
Mercury	Dust	0.007	0.01	0.01	0.007	7						Y?			N?	N?	N?	N	3
	Quench water	NA	63	77	420	7					Y?	Y?			N?	N?	N?	Y?	1
	Furnace residue	0.077	0.08	0.08	0.077	7						Y?			N?	N?	N?	N	3
Molybdenum, Ferromolybdenum, and Ammonium Molybdate	Flue dust/gases	NA	1.1	250	500	11					Y?				N?	N?	N?	N	3
	Liquid residues	1	1	1	1	2	Y?		Y?		Y?		Y?		N?	N?	N?	N	1
Platinum Group Metals	Slag	NA	0	0.05	0.46	3					Y?		Y?		N?	N?	N?	Y?	3
	Spent acids	NA	0.3	1.7	3	3					Y?			Y?	Y?	N?	N?	N	1
	Spent solvents	NA	0.3	1.7	3	3					Y?			Y?	N?	Y?	N?	N	1
Rare Earths	Spent ammonium nitrate processing solution	14	14	14	14	1									Y	N?	N?	N	1
	Electrolytic cell caustic wet APC sludge	NA	0.07	0.7	7	1									Y?	N?	N?	Y	3
	Process wastewater	7	7	7	7	1					Y				Y?	N?	N?	YS?	1
	Spent scrubber liquor	NA	0.1	500	1000	1									Y?	N?	N?	YS?	1
	Solvent extraction crud	NA	0.1	2.3	4.5	1									N?	Y?	N?	N	3
	Wastewater from caustic wet APC	NA	0.1	500	1000	1				Y?	Y?				Y?	N?	N?	YS?	1
Rhenium	Spent barren scrubber liquor	NA	0	0.1	0.2	2							Y?		N?	N	N	Y?	1
	Spent rhenium raffinate	88	88	88	88	2					Y?				N?	N?	N?	N	3
Scandium	Spent acids	NA	0.7	3.9	7	7									Y?	N?	N?	N	1
	Spent solvents from solvent extraction	NA	0.7	3.9	7	7									N?	Y?	N?	Y?	1
Selenium	Spent filter cake	NA	0.05	0.5	5	3							Y?		N?	N?	N?	Y?	3
	Plant process wastewater	66	66	66	66	2					Y				Y	N?	N?	YS?	1
	Slag	NA	0.05	0.5	5	3							Y?		N?	N?	N?	YS?	3
	Tellurium slime wastes	NA	0.05	0.5	5	3							Y?		N	N?	N?	Y?	3
	Waste solids	NA	0.05	0.5	5	3							Y?		N?	N?	N?	N	3

EXHIBIT 4-1 (continued)
MINERAL PROCESSING WASTES BY COMMODITY SECTOR

Commodity	Waste Stream	Reported Generation (1000mt/yr)	Est./Reported Generation (1000mt/yr)			Number of Facilities with Process	TC Metals								Corr	Ignit	Rctv	Current Recycle	Waste Form
			Min	Avg.	Max		As	Ba	Cd	Cr	Pb	Hg	Se	Ag					
Synthetic Rutile	Spent iron oxide slurry	45	45	45	45	1			Y?	Y?					N?	N?	N?	YS?	3
	APC dust/sludges	30	30	30	30	1			Y?	Y?					N?	N?	N?	Y	3
	Spent acid solution	30	30	30	30	1			Y?	Y?					Y?	N?	N?	Y	1
Tantalum, Columbium, and Ferrocolumbium	Digester sludge	1	1	1	1	2									Y?	N?	N?	N	3
	Process wastewater	150	150	150	150	2	Y?		Y?	Y?	Y?		Y?		Y	N?	N?	Y?	2
	Spent raffinate solids	2	2	2	2	2									Y?	N?	N?	N	3
Tellurium	Slag	NA	0.2	2	9	2							Y?		N?	N?	N?	YS?	3
	Solid waste residues	NA	0.2	2	9	2							Y?		N?	N?	N?	N	3
	Waste electrolyte	NA	0.2	2	20	2					Y?		Y?		N?	N?	N?	N	1
	Wastewater	NA	0.2	20	40	2							Y?		Y?	N?	N?	Y	1
Titanium and Titanium Dioxide	Pickle liquor and wash water	NA	2.2	2.7	3.2	3			Y?	Y?	Y?				Y?	N?	N?	YS?	1
	Scrap milling scrubber water	NA	4	5	6	1			Y?	Y?	Y?		Y?		N?	N?	N?	YS?	1
	Smut from Mg recovery	NA	0.1	22	45	2									N?	N?	Y	Y?	3
	Leach liquor and sponge wash water	NA	380	480	580	2				Y?	Y?				Y	N?	N?	YS?	1
	Spent surface impoundment liquids	NA	0.63	3.4	6.7	7				Y?	Y?				N?	N?	N?	Y?	1
	Spent surface impoundments solids	36	36	36	36	7				Y?	Y?				N?	N?	N?	N	3
	Waste acids (Sulfate process)	NA	0.2	39	77	2	Y			Y			Y	Y	Y	N	N	N	1
	WWTP sludge/solids	420	420	420	420	7				Y?					N	N	N	N	3
Tungsten	Spent acid and rinse water	NA	0	0	21	6									Y?	N?	N?	YS?	1
	Process wastewater	NA	2.2	4.4	9	6									Y?	N?	N?	YS?	1
Uranium	Waste nitric acid from uranium dioxide (UO_2) production	NA	1.7	2.5	3.4	17									Y?	N?	N?	YS?	1
	Vaporizer condensate	NA	1.7	9.3	17	17									Y?	N?	N?	N	1
	Superheater condensate	NA	1.7	9.3	17	17									Y?	N?	N?	N	1
	Slag	NA	0	8.5	17	17									N?	Y?	N?	Y	3
	Uranium chips from ingot production	NA	1.7	2.5	3.4	17									N?	Y?	N?	Y?	3

EXHIBIT 4-1 (continued)
MINERAL PROCESSING WASTES BY COMMODITY SECTOR

Commodity	Waste Stream	Reported Generation (1000mt/yr)	Est./Reported Generation (1000mt/yr)			Number of Facilities with Process	TC Metals								Corr	Ignit	Rctv	Current Recycle	Waste Form
			Min	Avg.	Max		As	Ba	Cd	Cr	Pb	Hg	Se	Ag					
Zinc	Acid plant blowdown	130	130	130	130	1	Y		Y	Y	Y?	Y?	Y	Y	Y	N	N	Y	1
	Waste ferrosilicon	17	17	17	17	1					Y?				N?	N?	N?	Y?	3
	Process wastewater	5000	5000	5000	5000	3	Y		Y	Y	Y		Y	Y	Y	N?	N?	Y?	1
	Discarded refractory brick	1	1	1	1	1	Y?		Y?	Y?	Y?				N?	N?	N?	N	3
	Spent cloths, bags, and filters	0.15	0.15	0.15	0.15	3			Y?		Y?	Y?	Y?	Y?	N?	N?	N?	Y	3
	Spent goethite and leach cake residues	15	15	15	15	3	Y		Y	Y	Y?	Y?	Y	Y	N?	N?	N?	Y	3
	Spent surface impoundment liquids	1900	1900	1900	1900	3			Y?						Y	N?	N?	YS?	1
	WWTP Solids	0.75	0.75	0.75	0.75	3	Y?		Y?		Y?	Y?	Y?	Y?	N?	N?	N?	YS	3
	Spent synthetic gypsum	16	16	16	16	3	Y?		Y		Y?				N?	N?	N?	N	3
	TCA tower blowdown	0.25	0.25	0.25	0.25	1			Y?		Y?	Y?	Y?		Y?	N?	N?	YS	1
	Wastewater treatment plant liquid effluent	2600	2600	2600	2600	3			Y?						N?	N?	N?	YS?	1
Zirconium and Hafnium	Spent acid leachate from Zr alloy prod.	NA	0	0	850	2									Y?	N?	N?	N	1
	Spent acid leachate from Zr metal prod.	NA	0	0	1600	2									Y?	N?	N?	N	1
	Leaching rinse water from Zr alloy prod.	NA	34	42	51	2									Y?	N?	N?	YS?	1
	Leaching rinse water from Zr metal prod.	NA	0.2	1000	2000	2									Y?	N?	N?	YS?	1

EPA next examined the current waste management practices in the mineral processing industry and estimated the potentially affected universe of mineral processing waste in reference to three baselines:

1. No-prior treatment baseline. The no-prior treatment baseline assumes that materials to be recycled are stored in unlined land based units, and the disposed portion is placed in a land based disposal unit without treatment.

2. Modified prior treatment baseline. The modified prior treatment baseline assumes that materials to be recycled are stored in unlined land based units, while materials to be disposed are treated to TC levels prior to disposal in land based units.

3. Prior treatment baseline. The prior treatment baseline assumes that materials to be recycled are stored according to RCRA requirements (i.e., spent materials are stored in tanks, containers, and buildings prior to recycling) and materials to be disposed are treated to TC levels prior to disposal in land based units.

Of the three baselines described above, EPA chose the modified prior treatment baseline as the basis for the RIA and the capacity analysis because it appears to be the most representative of current practices.[5] The modified prior treatment baseline is referred to as the "baseline" in the reminder of this chapter. The key features of the baseline include:

- Characteristic mineral processing wastes being disposed must be treated to UTS levels prior to disposal in Subtitle D disposal units;
- Operators of facilities that generate and manage hazardous mineral processing wastes must comply with record keeping and reporting requirements;
- Secondary mineral processing materials destined for recycling may be stored for up to one year;
- Recycling of non-mineral processing materials outside of RCRA Subtitle C jurisdiction is prohibited, i.e., the conditional exclusions for certain activities (as described below) are available only for mineral processing residues; and

[5] In the RIA, EPA evaluated two management scenarios under the modified prior treatment baseline: Conditional Exemption from RCRA Jurisdiction (Option 1) and Unconditional Exemption from RCRA Jurisdiction (Option 2). The management scenario selected by EPA and discussed in this section is the Conditional Exemption from RCRA Jurisdiction. The Unconditional Exemption from RCRA Jurisdiction is based on approaches advanced by the mineral processing industry and would maximize the ability of industry to recycle secondary materials without triggering *any* additional requirements. Under this scenario, all outputs from mineral processing facilities would be unconditionally excluded from RCRA jurisdiction regardless of how the materials are stored. Consequently, there would be no special requirements for any type of unit storing secondary materials. For more detailed information on the management scenarios, and the no-prior treatment and prior treatment baselines, see USEPA, *Application of the Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes: Regulatory Impact Analysis*, April 1998 (RIA).

- Hazardous mineral processing residues can be recycled to primary beneficiation operations/units without risk to the Bevill status of any beneficiation wastes generated by such units. That is, these operations would not become regulated Subtitle C units and resulting wastes from these units would not lose their Bevill status when mineral processing secondary materials are mixed with ores, minerals, or beneficiated ores or minerals, provided that: (1) at least 50 percent of the materials entering the operations are ores, minerals, or beneficiated ores or minerals, and (2) the mineral processing secondary materials are legitimately recycled.

Under the baseline, the post-rule management scenario would: (1) stimulate greater resource recovery in the minerals industry by classifying recoverable mineral processing residuals as wastes if they are managed in non-land-based units, and (2) ensure that appropriate waste treatment standards and technologies are applied to hazardous mineral processing wastes destined for land disposal, thereby protecting human health and the environment. In the post-rule management scenario, a conditional exclusion from the definition of solid waste would apply to a non-exempt mineral processing residue if the following conditions were met:

1. The material contains recoverable amounts of metals, acids, cyanide, water, or other values;

2. The material is legitimately recycled (as defined at 40 CFR 261.2(f));

3. The material is not accumulated speculatively (as defined at 40 CFR 261.1(c)(8));

4. The material is stored in tanks, containers, or buildings meeting minimum integrity standards; and

5. The owner or operator provides a one-time notification to the EPA Regional Administrator or State.

Alternatively, facility operators could obtain a determination from an authorized State or from the Regional Administrator that solid secondary materials may be placed on pads instead of in tanks, containers, or buildings. These pads must meet minimum design requirements so that the unit provides effective containment and will not become part of the waste disposal problem through discard.

The Agency, in developing the RIA for this rule, estimated the compliance costs for the post-rule management scenario as a function of three factors: (1) the expense associated with purchasing new storage units or upgrading existing storage units, (2) the expense of treating materials to be disposed, and (3) shifts of mineral processing residues either from recycling to disposal or from disposal to recycling. Based on these three factors, as well as adjustments to the input data to account for uncertainty about hazardous characteristics, EPA estimated the minimum, expected, and maximum quantities of waste that would require treatment and disposal, and the minimum, expected, and maximum quantities of waste that would require storage prior to recycling. Exhibit 4-2 provides the estimated quantities of the newly identified mineral processing wastes requiring treatment and disposal for the modified prior treatment baseline and the post-rule management scenario.

The quantities presented in Exhibit 4-2 were calculated by first accounting for uncertainty in the input data. As discussed in the RIA, each waste stream's generation rate was adjusted to account for uncertainty in hazardous characteristics. The generation rate of waste streams known to be hazardous were not adjusted, while the generation rates of waste streams that were only suspected of being hazardous were reduced in the expected value case, and dropped from the minimum value case. The hazardous portion of each stream was divided into a portion sent to treatment and disposal and a portion stored prior to recycling in the baseline and the post-rule management scenario. Shifts in management of these streams were modeled by using different percentages treated and disposed in the baseline and post-rule management scenario. The quantities sent to treatment and disposal were summed in each sector by waste type (i.e., wastewaters, wastes with 1 to 10 percent solids, wastes with more than 10 percent solids), and divided by the number of facilities in that sector, to get a "model" or average facility quantity of each waste type. These types were then aggregated together based on the portion of input material for each waste type that would require neutralization, dewatering, and/or stabilization and disposal. These model facility quantities were then compared with threshold values to determine the economic feasibility of on-site treatment and disposal.

As indicated in the RIA, EPA assumes that because of cost and other issues, the primary treatment technologies that are being used or will be used for waste management by the mineral processing industry are chemical precipitation (for wastewaters) and stabilization (for nonwastewaters). Because these treatments are two of the best demonstrated treatment technologies (BDATs) used as the basis for the UTS, then under the baseline most of these wastes likely are already meeting or are close to meeting the UTS levels. Even if additional treatment is required, EPA believes that this additional treatment could be achieved through minimal modifications of the existing treatment systems.

In the original proposal (60 FR 43654, August 22, 1995), the Agency noted a few exceptions to these assumptions. Based on the analysis of available data, EPA noted that some arsenic-containing wastes and high mercury-containing wastes (e.g., above the High Mercury Subcategory level of 260 mg/kg total mercury) may require alternative treatments (e.g., vitrification for arsenic and acid leaching/retorting for mercury) to meet UTS standards. EPA requested commenters to provide comments and performance data on this issue. However, comments received provided no indication that these wastes pose any treatability problems in meeting the proposed treatment standards. In addition, the Agency conducted site visits to commercial treatment facilities and collected data that indicated no treatability problems are associated with these waste streams.[6]

[6] Memoranda addressed to Anita Cummings from ICF: "Final Draft Trip Report for Mill Services," dated November 21, 1996; "Final Draft Trip Report for Rollins Highway 36 Facility," dated November 21, 1996; "Final Draft Site Visit Report for the September 11th Site Visit to GNB Battery Technologies Located in Frisco, Texas," dated December 6, 1996. These reports from site visits are available in the docket for today's rule.

EXHIBIT 4-2
WASTE GENERATION UNDER MODIFIED PRIOR TREATMENT
BASELINE AND POST-RULE MANAGEMENT SCENARIO (TONS)

		Modified Prior Treatment Baseline			Modified Prior Treatment Post-Rule Management Scenario		
Commodity	**Waste Stream**	**Min.**	**Expect.**	**Max.**	**Min.**	**Expect.**	**Max.**
Alumina and Aluminum	Cast house dust	2,864	2,864	2,864	4,773	4,773	4,773
	Electrolysis waste	-	4,313	8,625	-	7,188	14,375
Antimony	Autoclave filtrate	-	10,800	43,200	-	11,475	45,900
	Stripped anolyte solids	-	-	-	-	-	-
	Slag and furnace residue	-	10,500	21,000	-	10,500	21,000
Beryllium	Chip treatment wastewater	-	40,000	1,600,000	-	42,500	1,700,000
	Spent barren filtrate	13,750	13,750	13,750	19,250	19,250	19,250
	Filtration discard	-	23,000	90,000	-	23,000	90,000
Bismuth	Alloy residues	-	1,500	6,000	-	1,500	6,000
	Spent caustic soda	-	458	1,800	-	763	3,000
	Electrolytic slimes	-	2	30	-	3	50
	Lead and zinc chlorides	-	1,500	6,000	-	1,500	6,000
	Metal chloride residues	-	1,500	3,000	-	1,500	3,000
	Slag	-	500	10,000	-	500	10,000
	Spent electrolyte	-	3,050	12,000	-	3,050	12,000
	Spent soda solution	-	458	1,800	-	763	3,000
	Waste acid solutions	-	3,050	12,000	-	3,050	12,000
	Waste acids	-	40	160	-	43	170
Cadmium	Caustic washwater	-	143	2,850	-	238	4,750
	Copper and lead sulfate filter cakes	-	143	2,850	-	238	4,750
	Copper removal filter cake	-	143	2,850	-	238	4,750
	Iron containing impurities	-	950	19,000	-	950	19,000
	Spent leach solution	-	143	2,850	-	238	4,750
	Lead sulfate waste	-	143	2,850	-	238	4,750
	Post-leach filter cake	-	950	19,000	-	950	19,000
	Spent purification solution	-	950	19,000	-	950	19,000
	Scrubber wastewater	-	143	2,850	-	238	4,750
	Spent electrolyte	-	950	19,000	-	950	19,000
	Zinc precipitates	-	143	2,850	-	238	4,750
Calcium	Dust with quicklime	-	-	-	-	-	-

EXHIBIT 4-2 (continued)
WASTE GENERATION UNDER MODIFIED PRIOR TREATMENT
BASELINE AND POST-RULE MANAGEMENT SCENARIO (TONS)

		Modified Prior Treatment Baseline			Modified Prior Treatment Post-Rule Management Scenario		
Commodity	**Waste Stream**	**Min.**	**Expect.**	**Max.**	**Min.**	**Expect.**	**Max.**
Chromium and Ferrochromium	Electrostatic precipitator (ESP) dust	750	750	750	1,050	1,050	1,050
	Gas control tower (GCT) sludge	-	-	-	-	-	-
Coal Gas	Multiple effects evaporator concentrate	-	-	16,250	-	-	22,750
Copper	Acid plant blowdown	1,325,000	1,325,000	1,325,000	1,855,000	1,855,000	1,855,000
	Wastewater Treatment Plant (WWTP) sludge	-	750	1,500	-	1,050	2,100
	Spent furnace brick	-	225	450	-	375	750
Elemental Phosphorus	Andersen Filter Media	460	460	460	460	460	460
	Precipitator slurry	40,000	40,000	40,000	56,000	56,000	56,000
	Non-Hazardous Slurry Assurance Process (NOSAP) slurry	160,000	160,000	160,000	160,000	160,000	160,000
	Phossy Water	170,000	170,000	170,000	238,000	238,000	238,000
	Furnace scrubber blowdown	-	-	-	-	-	-
	Furnace Building Washdown	-	-	-	-	-	-
Fluorspar and Hydrofluoric Acid	Off-spec fluosilicic acid	-	1,875	11,250	-	2,625	15,750
Germanium	Waste acid wash and rinse water	-	880	3,200	-	935	3,400
	Chlorinator wet air pollution control sludge	-	85	320	-	90	340
	Hydrolysis filtrate	-	106	400	-	106	400
	Leach residues	-	5	10	-	5	10
	Spent acid/leachate	-	880	3,200	-	935	3,400
	Waste still liquor	-	106	400	-	106	400
Lead	Acid plant sludge	-	1,058	2,115	-	1,763	3,525
	Baghouse incinerator ash	300	3,000	30,000	300	3,000	30,000
	Slurried APC Dust	-	-	-	-	-	-
	Solid residues	-	29	59	-	49	98
	Spent furnace brick	-	-	-	-	-	-
	Stockpiled miscellaneous plant waste	240	52,800	103,200	255	56,100	109,650
	WWTP liquid effluent	-	-	-	-	-	-

EXHIBIT 4-2 (continued)
WASTE GENERATION UNDER MODIFIED PRIOR TREATMENT
BASELINE AND POST-RULE MANAGEMENT SCENARIO (TONS)

		Modified Prior Treatment Baseline			Modified Prior Treatment Post-Rule Management Scenario		
Commodity	**Waste Stream**	**Min.**	**Expect.**	**Max.**	**Min.**	**Expect.**	**Max.**
Magnesium and Magnesia from Brines	Cast house dust	-	57	1,140	-	95	1,900
	Smut	26,000	26,000	26,000	26,000	26,000	26,000
Mercury	Dust	-	4	7	-	4	7
	Quench water	-	5,775	63,000	-	9,625	105,000
	Furnace residue	-	39	77	-	39	77
Molybdenum, Ferromolybdenum, and Ammonium Molybdate	Flue dust/gases	-	126,500	495,000	-	126,500	495,000
	Liquid residues	-	500	1,000	-	500	1,000
Platinum Group Metals	Slag	-	3	68	-	6	113
	Spent acids	-	855	3,000	-	855	3,000
	Spent solvents	-	855	3,000	-	855	3,000
Rare Earths	Spent ammonium nitrate processing solution	14,000	14,000	14,000	14,000	14,000	14,000
	Electrolytic cell caustic wet APC sludge	-	-	-	-	-	-
	Process wastewater	5,600	5,600	5,600	5,950	5,950	5,950
	Spent scrubber liquor	-	200,000	800,000	-	212,500	850,000
	Solvent extraction crud	-	1,150	4,500	-	1,150	4,500
	Wastewater from caustic wet APC	-	200,000	800,000	-	212,500	850,000
Rhenium	Spent barren scrubber liquor	-	8	30	-	13	50
	Spent rhenium raffinate	-	44,000	88,000	-	44,000	88,000
Scandium	Spent acids	-	1,960	7,000	-	1,960	7,000
	Spent solvents from solvent extraction	-	294	1,050	-	490	1,750
Selenium	Spent filter cake	-	38	765	-	64	1,275
	Plant process wastewater	52,800	52,800	52,800	56,100	56,100	56,100
	Slag	-	204	4,080	-	217	4,335
	Tellurium slime wastes	-	38	765	-	64	1,275
	Waste solids	-	255	5,100	-	255	5,100

EXHIBIT 4-2 (continued)
WASTE GENERATION UNDER MODIFIED PRIOR TREATMENT
BASELINE AND POST-RULE MANAGEMENT SCENARIO (TONS)

		Modified Prior Treatment Baseline			Modified Prior Treatment Post-Rule Management Scenario		
Commodity	**Waste Stream**	**Min.**	**Expect.**	**Max.**	**Min.**	**Expect.**	**Max.**
Synthetic Rutile	Spent iron oxide slurry	-	18,000	36,000	-	19,125	38,250
	APC dust/sludges	-	-	-	-	-	-
	Spent acid solution	-	-	-	-	-	-
Tantalum, Columbium, and Ferrocolumbium	Digester sludge	-	500	1,000	-	500	1,000
	Process wastewater	22,500	22,500	22,500	37,500	37,500	37,500
	Spent raffinate solids	-	1,000	2,000	-	1,000	2,000
Tellurium	Slag	-	800	7,200	-	850	7,650
	Solid waste residues	-	1,000	9,000	-	1,000	9,000
	Waste electrolyte	-	1,000	20,000	-	1,000	20,000
	Wastewater	-	-	-	-	-	-
Titanium and Titanium Dioxide	Pickle liquor and wash water	-	1,080	2,640	-	1,148	2,805
	Scrap milling scrubber water	-	2,000	4,800	-	2,125	5,100
	Smut from Mg recovery	15	3,300	6,900	25	5,500	11,500
	Leach liquor and sponge wash water	304,000	384,000	464,000	323,000	408,000	493,000
	Spent surface impoundment liquids	-	257	1,008	-	429	1,680
	Spent surface impoundments solids	-	17,850	35,700	-	17,850	35,700
	Waste acids (Sulfate process)	200	40,000	78,000	200	40,000	78,000
	WWTP sludge/solids	-	210,000	420,000	-	210,000	420,000
Tungsten	Spent acid and rinse water	-	-	16,800	-	-	17,850
	Process wastewater	-	1,752	7,200	-	1,862	7,650
Uranium	Waste nitric acid from uranium dioxide (UO_2) production	-	1,020	2,720	-	1,084	2,890
	Vaporizer condensate	-	4,675	17,000	-	4,675	17,000
	Superheater condensate	-	4,675	17,000	-	4,675	17,000
	Slag	-	-	-	-	-	-
	Uranium chips from ingot production	-	191	510	-	319	850

EXHIBIT 4-2 (continued)
WASTE GENERATION UNDER MODIFIED PRIOR TREATMENT
BASELINE AND POST-RULE MANAGEMENT SCENARIO (TONS)

		Modified Prior Treatment Baseline			Modified Prior Treatment Post-Rule Management Scenario		
Commodity	**Waste Stream**	**Min.**	**Expect.**	**Max.**	**Min.**	**Expect.**	**Max.**
Zinc	Acid plant blowdown	-	-	-	-	-	-
	Waste ferrosilicon	-	1,275	2,550	-	2,125	4,250
	Process wastewater	765,000	765,000	765,000	1,275,000	1,275,000	1,275,000
	Discarded refractory brick	-	500	1,000	-	500	1,000
	Spent cloths, bags, and filters	-	-	-	-	-	-
	Spent goethite and leach cake residues	-	-	-	-	-	-
	Spent surface impoundment liquids	1,512,000	1,512,000	1,512,000	1,606,500	1,606,500	1,606,500
	WWTP Solids	-	94	188	-	131	263
	Spent synthetic gypsum	15,900	15,900	15,900	15,900	15,900	15,900
	TCA tower blowdown	-	31	63	-	44	88
	Wastewater treatment plant liquid effluent	-	1,044,000	2,088,000	-	1,109,250	2,218,500
Zirconium and Hafnium	Spent acid leachate from Zr alloy prod.	-	-	860,000	-	-	860,000
	Spent acid leachate from Zr metal prod.	-	-	1,600,000	-	-	1,600,000
	Leaching rinse water from Zr alloy prod.	-	16,800	41,600	-	17,850	44,200
	Leaching rinse water from Zr metal prod.	-	400,000	1,600,000	-	425,000	1,700,000
TOTALS:		4,431,379	7,031,998	15,830,551	5,695,263	8,438,770	17,638,656

Typically, wastewaters and liquid nonwastewaters (wastes with 1 to 10 percent TSS) are likely to undergo neutralization and precipitation, generating small quantities of solid residues requiring dewatering and stabilization. Therefore, as in the RIA, EPA assumed for this analysis that approximately 2.25 percent of the wastewaters and liquid nonwastewater quantities will be stabilized (based on an 85 percent reduction of the initial amount because of treatments such as settling and neutralization, and an additional 85 percent reduction because of dewatering). The reduced waste quantities are used for estimating the potentially affected universe of the newly identified mineral processing wastes.

4.4 SOIL AND DEBRIS CONTAMINATED WITH NEWLY IDENTIFIED MINERAL PROCESSING WASTES

Based on EPA's understanding of the mineral processing industry the majority of soil and debris contaminated with newly identified mineral processing wastes are assumed to be treated on-site to TC levels before disposal in a Subtitle D unit. As with the non-media wastes, these media currently are not required to comply with LDR requirements. However, today's rulemaking will require soil contaminated with newly identified mineral processing wastes to comply with the alternative treatment standards being finalized in today's rule. These standards require treatment of soil to 90 percent reduction in hazardous constituent concentration or 10 times the UTS. Contaminated debris will be subject to the treatment standards in 40 CFR 268.45.

In all of the data sources consulted by the Agency, there was little information on the amount of soil or debris that might be contaminated specifically with former Bevill-exempt wastes only and, in addition, require alternative treatment due to the Phase IV LDRs. However, of the media that are contaminated with only newly identified mineral processing wastes (which were brought into the Subtitle C universe in 1990), EPA expects that, based on typical industry practices, only a small portion will be excavated and require alternative treatment to meet the new LDR soil requirements.[7] That is, the only media contaminated with newly identified mineral processing wastes that are potentially affected by the Phase IV rule are those that are excavated and managed outside of a corrective action management unit (CAMU) or an area of contamination (AOC); and EPA expects these quantities to be small and to generally be treated such that the Phase IV soil standards are already being met. This latter point is supported by the fact that these media contain primarily only metal constituents, including cadmium, mercury, arsenic, selenium, chromium, lead, sliver, and barium, rather than more difficult to treat organic constituents.[8] Furthermore, based on more recent discussions with commercial treaters, several case studies, and other data (see Appendix E), the Agency has confirmed that these wastes are already being treated or could be readily treated to meet the final alternative treatment standards. In fact, many contaminated media cleanups are expected to benefit (i.e., either not incur cost or receive cost savings) from the alternative soil treatment standards. Notwithstanding this information, if significant quantities of contaminated soil do require alternative treatment, then as with TC metal contaminated media discussed in Section 3.4, sufficient alternative capacity exists to treat these wastes.

Mineral processing contaminated media that contains organic UHCs (e.g., organometallic soils) and

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[7] USEPA, *Application of the Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes: Regulatory Impact Analysis*, April 1998.

[8] USEPA, *Application of the Phase IV Land Disposal Restrictions to Newly Identified Mineral Processing Wastes: Regulatory Impact Analysis*, April 1998, Section 3.1.1.

manufactured gas plant (MGP) soils are both exceptions to this general rule. The exact volume of organometallic soils contaminated with newly identified mineral processing wastes based on the available waste constituent data (see Section 4.3) is unknown, although it is expected to be low.

The data in Appendix E and the analysis for TC metal soils in Section 3.4 show that (1) most soils likely are already meeting the new soil treatment standards and (2) ample capacity exists for soils not meeting the new standards. Regarding MGP soils, the Agency estimates that there are 2,500 potentially affected commercial MGP sites in the United States.[9] Captive sites (i.e., sites that treat wastes generated on site) comprise a larger universe of former MGP operations at approximately 28,700 potentially affected sites. Data provided by the utility industry[10] indicate that approximately 500 to 5,000 tons of contaminated soil is typically present at an MGP site. This capacity analysis, therefore, assumes that commercial sites (which are, in general, larger than captive sites) contain 5,000 tons of hazardous contaminated media, while captive sites contain 500 tons of hazardous contaminated media. Applying these quantity estimates to the estimates of potentially affected facilities, EPA estimates that 12.5 million tons (2,500 sites times 5,000 tons) of hazardous contaminated media eventually will be remediated at commercial sites, and 14.4 million tons (28,700 sites times 500 tons) of hazardous contaminated media eventually will be remediated at captive sites. However, many of these MGP sites have already been remediated or are in the process of remediation, thereby reducing the quantity of soil currently requiring remediation. Nevertheless, based on a 20-year remediation time frame, as much as 1.35 million tons/yr of MGP soil may be remediated.

The Agency reviewed treatment performance data from several MGP remediation case studies (Appendix G), which show that the alternative treatment standards being promulgated in today's rulemaking for hazardous soils can be readily achieved using several commercially available treatment technologies such as stabilization and thermal treatment. Furthermore, data provided by the utility industry[11] indicate that approximately 40 percent of the wastes will be co-burned in on-site utility boilers.[12] Some of the MGP sites may also choose to remediate using in-situ treatment technologies or containment technologies (e.g., capping with groundwater monitoring). Several commercial treaters also provide on-site remediation services for such sites. As shown for the TC metal wastes (Section 3.4 and Appendix E), available capacity for such wastes is measured in hundreds of thousands (and probably millions) of tons. Therefore, the Agency believes that the actual quantity of MGP soils requiring off-site commercial treatment capacity is sufficiently low such that adequate commercial treatment capacity exists for such soils.

4.5 MIXED RCRA/RADIOACTIVE WASTES

In today's rule, the Agency is promulgating treatment standards for mixed radioactive wastes at the UTS levels. However, the radioactivity posed by potentially hazardous mineral processing wastes may affect

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[9] Memorandum from ICF Incorporated addressed to Paul Borst, *Cost of the Phase IV Land Disposal Restrictions on MGP Wastes.* Dated January 28, 1998.

[10] Information provided by representatives of the utility industry at a meeting with EPA on July 10, 1997. For additional information, see "Meeting Between the EPA and the Representatives of the Utility Industry to Discuss Comments and Data Related to the Generation and Management of Historic Manufactured Gas Plant Wastes (MGP) Wastes - Draft Summary of Discussions" in the docket for today's rulemaking.

[11] Memorandum from ICF Incorporated addressed to Paul Borst, *Cost of the Phase IV Land Disposal Restrictions on MGP Wastes.* Dated January 28, 1998.

[12] In today's rulemaking, the Agency has confirmed its existing interpretation that residues from co-burning hazardous MGP soils along with coal are covered by the Bevill amendment (assuming the residues are not significantly affected by such burning), as provided in 40 CFR 266.112.

the amount of available treatment capacity for these wastes. Commercial and on-site treatment facilities for mineral processing wastes may have difficulty in managing both the radioactive and hazardous chemical components of mixed radioactive mineral processing wastes, and therefore may experience shortfalls in providing sufficient capacity for the treatment of these wastes. Adequate data on the generation of these mixed RCRA/radioactive wastes is not available. In the Phase IV proposed rules, the Agency had requested data on mineral processing wastes mixed with radioactive wastes from the industry. However, the Agency neither received any data on these wastes, not any commenters stated that these wastes would pose any difficulties. Nevertheless, as discussed in Chapter 2, the Agency recognizes the lack of available treatment capacity for these wastes and believes that any new commercial capacity that is available for mixed radioactive wastes must be used for mixed wastes that were regulated in previous LDR rulemakings and whose variances have already expired. Therefore, the Agency is granting a two-year national capacity variance for newly identified mineral processing wastes mixed with radioactive wastes.

4.6 SUMMARY OF RESULTS

EPA's analysis of the data in Exhibit 4-1 indicates that, at most, approximately 135 facilities that generate 121 waste streams could be affected by today's rule. The number of facilities represents the facilities in each mineral processing commodity sector. Some facilities, however, have processes that fall into more than one commodity sector. This would reduce the indicated total number of facilities affected.

Exhibit 4-3 presents ranges of quantities of newly identified mineral processing wastes generated under the modified prior treatment baseline and post rule management scenario. The results indicate that a total of approximately 4 million to 18 million metric tons of waste per year are being generated (excluding remediation waste). However, the majority (approximately 85 - 90 percent) is wastewater, which will be exempt for the most part from LDRs because of the Land Disposal Program Flexibility Act and thus are not addressed further in this analysis. Section 4.1 discusses this issue in more detail. EPA did not receive any comments on this issue in response to the Phase IV proposed rules and notices, and therefore has continued to exclude surface-disposed wastewaters from the capacity analysis in this final rule. Exhibit 4-4 provides the quantities of nonwastewaters potentially affected by today's rule for the modified prior treatment baseline and post-rule management scenario. Thus, the result when totaling off-site and on-site wastes is that approximately 176,000 to perhaps as high as 1.9 million mt/y of mineral processing nonwastewaters may require alternative treatment because of this rule (see Exhibit 4-4). Nevertheless, as discussed in Section 4.3, most of these wastes are likely already being treated and meeting the new treatment standards (e.g., under the maximum estimate for on-site stabilization for the post-rule management scenario, only about 66,568 mt/yr of waste—the difference between 1,867,174 and 1,800,606—will require treatment where none existed before, while the remaining 1,800,606 mt/yr will likely only need optimization of existing treatment).

EXHIBIT 4-3
TOTAL WASTE QUANTITIES (MT/YR) GENERATED
UNDER THE MODIFIED PRIOR TREATMENT BASELINE

	Minimum	Expected	Maximum
Baseline	4,431,379	7,032,223	15,831,001
Post-Rule Management Scenario	5,695,263	8,439,145	17,639,406

EXHIBIT 4-4
QUANTITIES (MT/YR) OF NONWASTEWATERS POTENTIALLY
AFFECTED UNDER THE MODIFIED PRIOR TREATMENT

	Minimum		Expected		Maximum	
	Off-Site Stab./Disp.	On-Site Stabilization	Off-Site Stab./Disp.	On-Site Stabilization	Off-Site Stab./Disp.	On-Site Stabilization
Baseline	36,411	108,777	58,553	662,824	21,399	1,801,056
Post-Rule Management Scenario	9,366	166,443	34,074	733,121	31,355	1,866,874

As indicated in Chapter 2, for metal bearing wastes exhibiting a hazardous characteristic, the UTS treatment standards are based on chemical precipitation, high temperature metals recovery (HTMR), stabilization, slag vitrification, acid leaching, and mercury roasting and retorting, depending on the hazardous constituents and the waste form. UTS for arsenic nonwastewaters is based on vitrification, and the BDAT for high mercury subcategory wastes is retorting/roasting. All other metal treatment standards for nonwastewaters are based on HTMR and stabilization technologies. UTS for wastewaters are based on treatments such as chemical precipitation. (A detailed discussion on the methodology used for selecting UTS as the treatment standard is provided in the BDAT background document for newly identified mineral processing wastes.[13])

In the original proposal (60 FR 43654, August 22, 1995), the Agency proposed treatment standards for TC metals and noted that some arsenic-containing wastes and high mercury-containing wastes (e.g., above the High Mercury Subcategory level of 260 mg/kg total mercury) may require alternative treatments (e.g., vitrification for arsenic and acid leaching/retorting for mercury) to meet UTS standards. EPA requested commenters to provide comments and performance data on this issue. However, comments received provided no indication that these wastes pose any treatability problems in meeting the treatment standards. In addition, the Agency conducted site visits to commercial treatment facilities and collected data that indicated no treatability problems are associated with these waste streams. Therefore, the Agency believes that the one-year national treatment capacity variance proposed in the original proposal is not required for these wastes and therefore, in this final rule, is not granting a capacity variance for these wastes (beyond the 90 days allowed prior to the effective date of rule).

For the purpose of determining the need for a capacity variance, the waste streams were grouped into

[13] USEPA, *Best Demonstrated Available Technology (BDAT) Background Document for Newly Identified Mineral Processing Wastes*, July, 1995.

three distinct categories:

(1) Waste streams from elemental phosphorus processing. Five large-volume waste streams—Medusa Scrubber Blowdown, furnace building washdown, Non-Hazardous Slurry Assurance Precipitator (NOSAP) slurry, precipitator slurry, and phossy water—generated by the elemental phosphorus processing industry (approximately 1,047,087 mt/yr) for which insufficient treatment capacity exists. The major generator of these waste streams, the FMC Corporation's Pocatello, Idaho facility, has stated that these waste streams pose unique treatability problems (e.g., due to the presence of naturally occurring radioactive materials) and that a two-year national capacity variance is needed to develop and construct treatment capacity. After careful review of the data provided by FMC Corporation (see Appendix H for supporting materials), the Agency has determined that these wastes would require a national capacity variance and, therefore, is granting a two-year national capacity variance for these five waste streams.

(2) Other newly identified mineral processing wastes (including soil and debris). EPA estimates that the quantities of newly identified mineral processing nonwastewaters that could be affected by today's rule (other than the mixed RCRA/radioactive wastes discussed above) range from approximately 176,000 to 1.9 million metric tons/year under the modified prior treatment baseline and the post-rule management scenario (Exhibit 4-4). Most of these wastes are expected to need either none or only minor treatment to meet the treatment standards being promulgated today and, as shown in Exhibit 4-4, at most only about 75,000 tons/yr (the total of the difference between the maximums for the post-rule management scenario and baseline) will require entirely new treatment. Furthermore, less than one percent of the nonwastewaters are expected to require commercial off-site stabilization. Given this, as well as the large amount of available off-site and on-site stabilization and other capacity for nonwastewaters[14] (at least several million tons/year; see Chapter 2), a national capacity variance (beyond 90 days) is not warranted for these wastes under a modified prior treatment baseline option. As indicated in Section 4.4, these conclusions also apply to soil and debris contaminated with newly identified mineral processing wastes.

(3) Mixed RCRA/radioactive wastes (including soil and debris). Despite the uncertainty about quantities of mixed radioactive wastes containing newly identified wastes that would require treatment as a result of today's rule, any new commercial capacity that becomes available will be needed for mixed radioactive wastes that were regulated in previous LDR rulemakings and whose variances have already expired. Thus, EPA has determined that sufficient alternative treatment capacity is not available, and thus is granting a two-year national capacity variance for mixed RCRA/radioactive wastes contaminated with newly identified mineral processing wastes. See Section 4.5 for additional discussion of this issue.

Exhibit 4-5 provides a summary of the results of the required (under the modified prior treatment baseline) and available capacity analysis and the capacity variances being granted in today's rulemaking for the newly identified mineral processing wastes.

[14] Landfill capacity, although not discussed in Chapter 2, will not pose a problem for these wastes. Once treated, these wastes will only require Subtitle D landfill capacity, which is expected to be substantial given that industrial nonhazardous wastes are landfilled at the rate over 20 million tons/year (USEPA, *Summary of Data on Industrial Non-Hazardous Waste Disposal Practices*, December 1985).

EXHIBIT 4-5
NATIONAL CAPACITY VARIANCES
FOR MINERAL PROCESSING WASTES AFFECTED BY THE PHASE IV LDR FINAL RULE

Waste	Required Capacity (mt/yr)	Available Capacity (mt/yr)	National Variance[a]
Newly Identified Mineral Processing Wastes from Elemental Phosphorus Processing	1,047,087	Low (<< 1 million)	Two years
Newly Identified Mineral Processing Wastes (Including Soil and Debris)	<< 1.9 million (modified prior treatment baseline)	Optimization of on-site stabilization > several million of stabilization > 16,200 of vitrification	90 days
Newly Identified Mixed/RCRA Radioactive Wastes (Including Soil and Debris)	Unknown[b]	0	Two years

[a] National capacity variances begin when the rule is published in the Federal Register.

[b] Significant uncertainty exists concerning the volume of wastes affected by today's rulemaking. Despite this uncertainty, however, EPA has determined that no alternative treatment capacity is available.