ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 148, 261, 266, 268, and 271

[EPA–F–98–2P4F–FFFFF; FRL–6010–5]

RIN 2050 AE05

Land Disposal Restrictions Phase IV: Final Rule Promulgating Treatment Standards for Metal Wastes and Mineral Processing Wastes; Mineral Processing Secondary Materials and Bevill Exclusion Issues; Treatment Standards for Hazardous Soils, and Exclusion of Recycled Wood Preserving Wastewaters

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: This rule promulgates Land Disposal Restrictions treatment standards for metal-bearing wastes, including toxicity characteristic metal wastes, and hazardous wastes from mineral processing. The set of standards being applied to these wastes is the universal treatment standards. These standards are based upon the performance of the Best Demonstrated Available technologies for treating these, or similar, wastes. This rule also revises the universal treatment standards for twelve metal constituents, which means that listed and characteristic wastes containing one or more of these constituents may have to meet different standards than they currently do.

In a related section regarding wastes and secondary materials from mineral processing, EPA is amending the rules to define which secondary materials from mineral processing are considered to be wastes and potentially subject to Land Disposal Restrictions. The intended effect is to encourage safe recycling of mineral processing secondary materials by reducing regulatory obstacles to recycling, while ensuring that hazardous wastes are properly treated and disposed. EPA also is finalizing decisions on a set of mineral processing issues wastes which courts have been remanded to EPA. These include retaining the Toxicity Characteristic Leaching Procedure as the test for identifying the toxicity characteristic for mineral processing wastes, and readdressing the regulatory status of a number of miscellaneous mineral processing wastes.

This rule also amends the LDR treatment standards for soil contaminated with hazardous waste. The purpose of this revision is to create standards which are more technically and environmentally appropriate to contaminated soils than those which currently apply.

Finally, this rule excludes from the definition of solid waste certain shredded circuit boards in recycling operations, as well as certain materials reused in wood preserving operations.

EFFECTIVE DATES: This final rule is effective on August 24, 1998.

Compliance dates:

—For prohibition on underground injection of certain wastes at 40 CFR 148.18: May 26, 2000;

—For definition of solid waste provisions at 40 CFR 261.2, 261.4(a)(15), and 261.4(b): November 27, 1998;

—For exclusion of recycled wood preserving wastewaters at 40 CFR 261.4(a)(9): May 26, 1998;

—For prohibition on land disposal of wastes from elemental phosphorus processing and on mixed radioactive wastes at 40 CFR 268.34(b): May 26, 2000; and

—For land Disposal Restrictions treatment standards at 40 CFR 268.49 for soil contaminated with previously prohibited wastes: May 26, 1998.

ADDRESSES: Supporting materials are available for viewing in the RCRA Information Center (RIC), located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, Virginia. The docket information number is F–98–2P4F–FFFFF. The RIC is open from 9 a.m. to 4 p.m., Monday through Friday, excluding federal holidays. To review docket materials, it is recommended that the public make an appointment by calling (703) 603–9230. The public may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost $0.15/page. The index and some supporting materials are available electronically. See the ''Supplementary Information'' section for information on accessing them.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA Hotline at (800) 424–9346 or TDD (800) 553–7672 (hearing impaired). In the Washington, D.C. metropolitan area, call (703) 412–9810 or TDD (703) 412–3323.

For more detailed information on specific aspects of this rulemaking, contact the Waste Treatment Branch (5302W), Office of Solid Waste (OSW), U.S. Environmental Protection Agency, 401 M Street S.W., Washington, D.C. 20460; phone (703) 308–8434. For information on the issue of treatment standards for metal-bearing wastes, contact Elaine Eby (703) 308–8449 or Anita Cummings at (703) 308–8303. For questions on land disposal restrictions (LDR) treatment standards for mineral processing wastes, radioactive mixed wastes, and grab versus composite sampling methods, contact Anita Cummings at (703) 308–8303. For information on treatment standards for manufactured gas plant wastes, contact Rita Chow at (703) 308–6158. Contact Rhonda Minnick at (703) 308–8771 for information on improvements and corrections to the Land Disposal Restrictions. For information on secondary mineral processing materials and Bevill issues, call Ashley Allen at 703–308–8419 or Stephen Hoffman of the Industrial and Extractive Wastes Branch at (703) 308–8413. For questions on treatment standards for hazardous soil, contact Elizabeth McManus of the Permits and State Programs Division at (703) 308–8657. Contact Stephen Bergman of the Hazardous Waste Identification Division at (703) 308–7262 for questions on the exclusion for wood preserving wastewaters. For information on the capacity analyses, contact Bill Kline at (703) 308–8440 or C. Pan Lee at (703) 308–8478. For questions on the regulatory impact analyses, contact Paul Borst at (703) 308–0481. For other questions, call Sue Slotnick at (703) 308–8462.

SUPPLEMENTARY INFORMATION:

Availability of Rule on the Internet: Please follow these instructions to access the rule: From the World Wide Web (WWW), type http://www.epa.gov/rules and regulations. In addition, several technical background documents contained in the docket supporting this rule will be available on the Internet at http://www.epa.gov/offices and regions/oswer.

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I. Introduction to the Phase IV Rule

In the 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA), Congress specified that land disposal of hazardous waste is prohibited unless the waste first meets treatment standards established by EPA or is disposed in units from which there will be no migration of hazardous constituents for as long as the waste remains hazardous. The HSWA amendments require that treatment standards must substantially diminish the toxicity or mobility of hazardous waste, so that short- and long-term threats to human health and the environment are minimized.

Today's Phase IV final rule is the latest in a series of LDR rules that establish treatment standards for wastes identified or listed as hazardous after the date of the 1984 amendments. (See RCRA § 3004(g)(4)). EPA proposed the Phase IV rule in four **Federal Register** notices, and issued three NODAs setting out additional data relevant to this proceeding. In two **Federal Register** notices prior to today's, EPA promulgated various rules proposed in the Phase IV proposals: treatment standards for wood preserving wastes, paperwork reduction, and clarification of treatability variances. Today's final rule promulgates regulations addressing most of the remaining issues discussed in Phase IV proposals and NODAs. The table at the end of this introduction lists references for all the Phase IV Notices, plus others cited frequently in the preamble.

This final Phase IV preamble contains five major, interrelated sections. The first section explains the new land disposal restrictions treatment standards for wastes identified as hazardous because they exhibit the toxicity characteristic for metals (referred to as ''TC metal wastes''). The section also revises the universal treatment standards (UTS) for 12 metal constituents in all hazardous wastes. The TC metal wastes will now be required to meet the universal treatment standards as do most other hazardous wastes. The second major preamble section establishes the prohibition on land disposal plus treatment standards for a particular type of newly identified hazardous waste: mineral processing waste that exhibits a characteristic of hazardous waste. The third section addresses additional issues affecting both TC metal wastes and characteristic mineral processing wastes. The fourth section amends the rules defining when secondary materials being recycled are solid wastes. It states that secondary materials from mineral processing which are generated and reclaimed within that industry are not solid wastes unless they are managed in land disposal units before being reclaimed. Such materials are not subject to regulation as hazardous wastes. That part of the preamble also addresses other issues related to mineral processing. The final major preamble section promulgates amended treatment standards for soil that contains hazardous waste or which exhibits a characteristic of hazardous waste.

Today's rule also includes two brief sections on hazardous waste issues unrelated to the major sections. One clarifies that a previously-promulgated exclusion from hazardous waste regulation for recycled shredded circuit boards also applies to whole circuit boards under certain conditions. The other section promulgates an exclusion from RCRA jurisdiction for certain wood preserving wastewaters and spent wood preserving solutions when recycled.

TABLE OF SELECTED LDR FEDERAL REGISTER NOTICES

Common name	Title of rule in FEDERAL REGISTER	Date	Citation
Third Third LDR Final Rule	Land Disposal Restrictions for Third Third Scheduled Wastes; Rule.	June 1, 1990	55 FR 22520.
Phase II LDR Proposal	Land Disposal Restrictions for Newly Identified and Listed hazardous Waste and hazardous soil; Proposed Rule.	September 14, 1993	58 FR 48092.
Phase III LDR Proposal	Land Disposal Restrictions Phase III: Decharacterized Wastewaters, Carbamate and Organobromine Wastes, and Spent Potliners; Proposed Rule.	March 2, 1995	60 FR 11702.
Phase IV Original Proposal	Land Disposal Restrictions—Phase IV: Issues Associated With Clean Water Act Treatment Equivalency, and Treatment Standards for Wood Preserving Wastes and Toxicity Characteristic Metal Wastes; Proposed Rule.	August 22, 1995	60 FR 43654.
Phase IV First Supplemental Proposal.	Land Disposal Restrictions—Clarification of Bevill Exclusion for Mining Wastes, to the Definition of Solid Waste for Mineral Processing Wastes, Treatment Standards for Characteristic Mineral Processing Wastes, and Associated Issues.	January 25, 1996	61 FR 2338.
HWIR Media Proposal	Requirements for Management of Hazardous Contaminated Media.	April 29, 1996	61 FR 11804.
Phase IV NODA #1	Land Disposal Restrictions Phase IV Proposed Rule—Issues Associated With Clean Water Act Treatment Equivalency, and Treatment Standards for Wood Preserving Wastes and Toxicity Characteristic Metal Wastes; Notice of Data Availability.	May 10, 1996	61 FR 21417.
Phase IV NODA #2	Land Disposal Restrictions—Phase IV: Treatment Standards for Characteristic Metal Wastes; Notice of Data Availability.	March 5, 1997	FR 62 10004.
Phase IV LDR Wood Preserving Final Rule.	Land Disposal Restrictions Phase IV: Treatment Standards for Wood Preserving Waste, Paperwork Reduction and Streamlining, Exemptions from RCRA for Certain Processed Materials; and Miscellaneous Hazardous Waste Provisions; Final Rule.	May 12, 1997	62 FR 25998.
Phase IV Second Supplemental Proposal.	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.	May 12, 1997	62 FR 26041.

TABLE OF SELECTED LDR FEDERAL REGISTER NOTICES—Continued

Common name	Title of rule in FEDERAL REGISTER	Date	Citation
Phase IV NODA #3	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; Notice of Data Availability.	November 10, 1997	62 FR 60465.
Treatability Variance Final Rule	Clarification of Standards for Hazardous Waste Land Disposal Restriction Treatment Variances.	December 5, 1997	62 FR 64504.

II. Potentially Regulated Entities

Entities potentially regulated by this final rule vary according to the section of the rule. The following table shows the industry categories that may be regulated according to each major section of the rule. The table is not intended to be exhaustive or definitive with respect to every case-specific circumstance. Rather, it is a general guide for readers regarding entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated, and failure to mention them in the table should not be taken as any type of regulatory determination on the part of the Agency.

TABLE OF ENTITIES POTENTIALLY AFFECTED BY THE PHASE IV FINAL RULE

Section of the rule	Category	Examples of entities potentially affected
LDR treatment standards for TC metal hazardous wastes, characteristic mineral processing wastes, and other metal-bearing wastes.	Generators of Toxicity Characteristic (TC) metal hazardous wastes (D004—D011), characteristic mineral processing waste, or any hazardous waste required to meet the LDR treatment standard for antimony, barium, beryllium, cadmium, chromium, lead, nickel, selenium, silver, thallium, vanadium, or zinc.	Facilities in the following industries: primary mineral processing, chemical manufacturers, pharmaceutical producers, paint producers, manufacturers of motor vehicle parts, blast furnaces and steel mills, metal plating and polishing, and aircraft parts and equipment.
	Facilities that treat and/or dispose of TC metal hazardous wastes, characteristic mineral processing wastes, and other metal-bearing hazardous wastes.	Hazardous waste treatment and disposal facilities.
LDR treatment standards for hazardous soil.	Entities managing hazardous soil	Private or public parties remediating sites containing hazardous soil
Mineral Processing Secondary Materials	Facilities that generate, store, and/or recycle secondary materials from primary mineral processing.	Copper smelters, gold refiners, and other primary metals producers that return wastestreams to units for additional recovery
Exclusion for Recycled Wood Preserving Process Wastewaters.	Wood Preserving Facilities	Facilities that generate and reclaim drippage and wastewaters on-site from the wood processing industry.

III. Revised Land Disposal Restrictions (i.e., Universal Treatment Standards) for Metal Constituents in all Hazardous Wastes, Including Toxic Characteristic Metals

Summary

There are two purposes to today's new treatment standards for metal-containing wastes. First, EPA is revising the numerical standards because new data are available on which to base more accurate standards. Second, EPA is including a new set of wastes in the current treatment standard regime, continuing EPA's efforts to apply the same LDR treatment standards when technically and legally possible. (In a subsequent section of this rule, EPA is expanding the treatment standard regime to include yet another set of wastes. These are characteristic mineral processing wastes that are not currently subject to land disposal restrictions.)

The numerical standards that EPA is revising are the universal treatment standards (UTS) for 12 metal constituents. The new UTS will apply to nonwastewater forms of any listed or characteristic hazardous waste that is already required to meet the UTS for those constituents in the waste. The revised UTS are less stringent for 7 constituents, and more stringent for 5. The rule does not affect the UTS for wastewater forms of these wastes, and does not change the UTS for any other constituents, including any of the organics.

The new set of wastes that EPA is bringing into the current LDR regime is the group of 8 wastes known as TC metal wastes—wastes identified as hazardous because they exhibit the toxicity characteristic due to the presence of the metals enumerated in 261.24 (Waste codes D004–D011). These are wastes that exhibit the toxicity characteristic because of high toxic metal content. By today's rule, that key metal must be treated to the UTS for that metal. Furthermore, any underlying hazardous constituents (UHCs) must be treated to UTS levels as well, whether these UHCs are organics or metals. Both wastewater and nonwastewater forms of the TC metal wastes are affected by today's rule, except for arsenic, for which only the wastewater forms are affected.

Hazardous wastes that exhibit both the TC for metals and the predecessor characteristic based on the Extraction Procedure (EP) are presently only required to be treated to reduce metal levels to below the characteristic level. Today's rule, for the most part, will require additional treatment of these metal constituents before land disposal can occur.

The Agency also finds that the treatment standards established in today's rule are not established below levels at which threats to human health and the environment are minimized. See *Hazardous Waste Treatment Council v. EPA*, 886 F.2d 355, 362 (D.C. Cir. 1990). That case held that the statute can be read to allow either technology-based or risk-based LDR treatment standards, and further held that technology-based standards are permissible so long as they are not established ''beyond the point at which there is no 'threat' to human health or the environment.'' *Id.* at 362. EPA's finding that today's standards are not below a ''minimize threat'' level is based on the Agency's inability at the present time to establish concentration levels for hazardous constituents which represent levels at which threats to human health and the environment are minimized. As the Agency has explained a number of times, determining these levels on a national basis—which requires determination of relevant exposure pathways and potential receptors for all hazardous constituents in hazardous wastes, with all the attendant uncertainties involved in such a national determination—has not yet proven possible. See, *e.g.*, 55 FR at 6642 (February 26, 1990). Thus, the Agency continues to find that technology-based standards remain the best approach for the national treatment standards since such standards eliminate as much of the inherent uncertainty of hazardous waste land disposal and so fulfill the Congressional intent in promulgating the land disposal restrictions provisions. *Id.* However, the Agency believes that it may be possible to make valid determinations that threats to human health and the environment are minimized on an individualized basis in the context of certain site-specific remediations, and accordingly has provided in this rule a variance from technology-based treatment requirements for contaminated soils generated in certain remediations. See section VII below.

A. History of Metal Treatment Standards

Land disposal of hazardous wastes is largely prohibited by statute, unless the wastes meet the applicable treatment standards established by EPA prior to land disposal. See RCRA sections 3004(d)–(g), (m); (the exception for no-migration units is not relevant to today's rule). Until today's rule, metals that were characteristic because they failed the Toxicity Characteristic Leaching Procedure (TCLP) and also failed the Extraction Procedure (EP)—which preceded the use of the TCLP as a means of identifying whether a waste exhibited a characteristic of hazardous waste—were subject to treatment standards at levels equal to the TC levels (55 FR 22520, June 1, 1990). (Note that wastes that were characteristic according to the TCLP but did not fail the EP were considered, until promulgation of today's rule, to be newly identified wastes, and were not subject to the LDR requirements. Today's rule makes these wastes subject to LDR). However, the TC levels are typically higher than those treatment levels for which threats posed by land disposal of the wastes are minimized. (*Waste Management v. EPA*, 976 F.2d 2, 13–14, 26–27, 32 (D.C. Cir. 1992). Consequently, treatment to levels lower than the characteristic levels normally is required. *Id.*

In an effort to make treatment standards as uniform as possible while adhering to the fundamental requirement that the standards must minimize threats to human health and the environment, EPA developed the UTS. Under the UTS, whenever technically and legally possible, the Agency adopts the same technology-based numerical limit for a hazardous constituent regardless of the type of hazardous waste in which the constituent is present (see 40 CFR 268.40; and 59 FR 47982, September 19, 1994). In the original Phase IV proposal, EPA proposed to apply the metal UTS, as measured by the TCLP (60 FR 43582, August 22, 1995; see 40 CFR 261.24), to all TC metal wastes. The TCLP measures the possibility that a waste may leach toxic metals above a designated concentration level under certain assumed disposal conditions, and so is a measure of the potential mobility of toxic metals in a waste.

Commenters in response to the original proposal took issue with the Agency's use of data previously used to establish metal UTS as a basis for establishing the treatment standards for characteristic metal wastes. The commenters raised three basic issues with regard to the data transfer. First, they said that characteristic metal wastes are extremely variable and the data used to calculate the treatment standards were not representative of the diversity of TC metal wastes. Second, the commenters said that although two treatment technologies—high temperature metals recovery (HTMR) and stabilization—were determined to be Best Demonstrated Available Technology (BDAT), the current metals UTS were based solely on HTMR, a technology not commercially available for many TC metal wastes. Finally, commenters asserted that individual metal UTS values were not uniformly achievable when waste streams with multiple toxic metals were being treated. In light of these concerns, the commenters urged the Agency to obtain additional data that would demonstrate the effectiveness of stabilization on TC metal waste streams and more fully characterize the diversity of treatment of these nonwastewaters. The following commenters provided the Agency with stabilization performance data: Battery Council International, American Foundrymen's Association, Chemical Waste Management, and the Environmental Treatment Council. While extensive, the data unfortunately was based on composite samples and could not be used as the basis for treatment standards (see USEPA, Final Best Demonstrated Available Technology (BDAT) Background Document for Quality Assurance/Quality Control Procedures and Methodology, Office of Solid Waste, October 23, 1991 and 62 FR 26041 for a discussion of grab and composite sampling).

The Agency, however, was convinced that additional data were needed to further assess the treatment of TC metal nonwastewaters. During September 1996, EPA conducted site visits at three hazardous waste treatment facilities and collected additional treatment performance data. One facility was a large commercial TSDF that employed conventional stabilization techniques to treat a wide array of inorganic metal wastes. Another was an on-site treatment facility that focused on the stabilization of inorganic metal slag. A third facility was commercial and focused on stabilization of inorganic materials using non-conventional stabilization techniques. During these site visits, the Agency either gathered performance data from company records or requested the collection of actual treatment performance data through sampling and analysis.

Treatment data were collected for the following types of hazardous waste: mineral processing waste, baghouse dust, battery slag, soils, pot solids, recycling by-products, and sludge. See the memorandum, Final Revised Calculation of Treatment Standards Using Data Obtained From Rollins Environmental's Highway 36 Commercial Waste Treatment Facility and GNB's Frisco, Texas Waste Treatment Facility, March 10, 1997 and the memorandum, Transferability of UTS to Mineral Processing Wastes, January 28, 1997 for a complete description of the waste constituents and concentrations. Most of the wastes contained multiple metals in various concentrations while some had significant concentrations of typically two metal combinations, including lead and cadmium, barium and lead, and chromium and antimony. In addition, between October 1994 and December 1995, the Agency obtained performance data from one HTMR facility; (other HTMR data became available very late in 1997). The assessment of the new data sets began with the calculation of treatment standards for each of the two data sets representing stabilization and HTMR. The same methodology, sometimes called ''C 99,'' and used in past LDR rulemakings, was used to calculate the treatment levels (see 56 FR 41164, August 18, 1991, and the BDAT Background Document for K061, dated August, 1991). Next, the Agency compared the treatment levels for stabilization verses HTMR. Based on this comparison, the Agency selected the highest level for each metal as the proposed UTS to allow for waste and process variability and detection limit difficulties. This approach is consistent with the legislative goal of providing substantial treatment through standards that are achievable by an array of well-performing, available treatment technologies. See 130 Cong. Rec. S 9184 (Daily ed., July 25, 1984) (statement of Senator Chafee).

As a result, the Agency issued a Second Supplemental Proposal on May 12, 1997 (62 FR 26041). In it, EPA proposed to change the numerical limits for all nonwastewater wastes containing the following metal constituents: antimony, barium, beryllium, cadmium, chromium, lead, nickel, selenium, silver, and thallium. (62 FR at 26047, May 12, 1997). The Agency also reproposed to change the numerical limits for vanadium in P119 and P120 nonwastewaters, and for zinc in K061 nonwastewaters. (62 FR at 26047, May 12, 1997). EPA also proposed these same UTS treatment standards for TC metal wastes identified as hazardous due to concentrations of barium, cadmium, chromium, lead, selenium and silver.

The Agency would like to correct in today's rule a prior error that was discovered in calculating the metals treatment levels using the HTMR treatment data. As previously stated, in the Second Supplemental and in today's preamble, in determining the treatment levels for each metal constituent, the Agency compared the treatment standards calculated with data from HTMR and stabilization. Based on this comparison, the highest level for each metal was chosen as the treatment standard. In reviewing the calculations from the HTMR data set, the Agency discovered an error in the calculations. When applying the methodology presented in USEPA, ''Final Best Demonstrated Technology (BDAT) Background Document for Quality Assurance/Quality Control Procedures and Methodology,'' dated October 23, 1991, it was discovered that the Agency failed to conduct a ''Z-score test'' to remove any outliers—data that is either so high or so low that it is not considered to be representative of the population from which the data are drawn. EPA uses this statistical method to confirm that certain data do not represent treatment by a well-operated system, or reflect anomalously low levels which are not typically achievable. This error was found to have occurred only in the calculation of the treatment standards based on the performance of HTMR; the treatment standards based on the performance of stabilization were properly calculated. The proposed treatment standards for cadmium, chromium, nickel, and silver were affected. The application of the Z-score outlier test resulted in 2 data points out of 40 being eliminated as outliers for both cadmium and chromium. For nickel, 5 out of 122 data points were identified as outliers.

For silver, 3 out of 114 data points were identified as outliers. Three of the resulting, calculated treatment standards changed slightly and are slightly more stringent than the proposed standards: cadmium from proposed 0.20 to corrected 0.11 mg/L TCLP; chromium from proposed 0.85 to corrected 0.60 mg/L TCLP; and nickel from proposed 13.6 to corrected 11 mg/L TCLP. Silver, on the other hand, changed from the proposed 0.11 mg/L TCLP to a corrected, slightly less stringent 0.14 mg/L TCLP. (Note: In re-calculating this standard, the Agency added an additional 74 data points which were submitted by the INMETCO Company (a high temperature metal reclaimer) in their comments to the May 12 supplemental proposal.) The Agency believes that these re-calculations are not significant because these four revised standards are each still achievable. See Memorandum, ''Calculation of Universal Treatment Standard (UTS) for HTMR Residues Using Data Submitted by Horsehead Research Development (HRD) Co., Inc. And INMETCO,'' December 17, 1997.

B. Applicability of Metal Treatment Standards

As noted earlier, today's rule finalizes LDR treatment standards in two ways. First, it revises the UTS levels for 10 metal constituents in nonwastewater forms of hazardous wastes. The 10 include antimony, barium, beryllium, cadmium, chromium, lead, nickel, selenium, silver, and thallium. These treatment standards will replace the existing UTS values. In addition, EPA is applying UTS for the first time to 8 TC metal wastes: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The UTS apply to both wastewater and nonwastewater forms of the wastes (except for TC arsenic wastes, for which the UTS apply to wastewater forms only), and to both organic and metal underlying hazardous constituents in them. No TC metal wastes have had to meet standards for underlying hazardous constituents before today, and wastes exhibiting only the TC and not the EP were not yet prohibited. (Note, some subcategories of mercury and arsenic TC metal wastes have treatment methods requiring use of a specified technology, and are not affected by today's rule.) The Agency is also adjusting the treatment standards for vanadium in P019 and P020 nonwastewaters as well as zinc in K061 nonwastewaters.

The metal treatment standards being promulgated today have broad applicability. They apply to the following metal-containing hazardous wastes: (1) characteristic metal wastes, including both the newly identified wastes that, heretofore, were not prohibited from land disposal; and metal wastes that were identified as hazardous under the predecessor leaching protocol, the Extraction Procedure (EP), which remain hazardous because they also exhibit the TC by the TCLP; (2) mineral processing wastes which exhibit the toxicity characteristic for metal (this is actually a subset of wastes in (1) above); (3) listed hazardous wastes which have metal constituents; (4) underlying hazardous constituents (UHCs) that are metals in any characteristic hazardous waste (including mineral processing waste which exhibit a characteristic) that is disposed in other than a Clean Water Act (CWA) or CWA-equivalent wastewater treatment system (see 40 CFR 268.2(i); 59 FR 47982, September 19, 1994); and (5) radioactive wastes mixed with the wastes mentioned in (1)–(4) above.

C. Development of New Treatment Standards for Hazardous Wastes Containing Metals

1. Measuring Compliance by Grab or Composite Sampling

As explained in the May 12, 1997 Second Supplemental Phase IV proposal, EPA establishes treatment standards using data obtained by grab sampling, not composite sampling, and likewise assesses compliance with these standards using grab sampling. 62 FR at 26047. This approach was sustained by the D.C. Circuit Court of Appeals in *Chemical Waste Management v. EPA*, 976 F. 2d at 34, and EPA did not and is not reopening the issue in this proceeding. The Agency has now obtained requisite grab sampling data. As a result, the treatment standards promulgated in this rule are all based upon treatment performance that was measured through the use of grab sampling. All compliance likewise will be based on grab sampling.

2. Development of Treatment Standards for Metal Wastes

All of the metals described below are on the UTS list and some are also TC metals. This section discusses development of both the TC and UTS treatment standard levels. The Agency is presenting the metal treatment standards alphabetically by constituent. Depending on the constituent, one or more treatment standards is discussed. For example in the section entitled, ''Treatment Standards for Barium Waste,'' the Agency discusses the promulgation of three treatment standards: (1) 21 mg/L TCLP for nonwastewater forms of D005 waste (based on the UTS); (2) 1.2 mg/L for wastewater forms of D005 waste (also based on the UTS); and (3) a revised UTS of 21 mg/L TCLP for barium nonwastewaters. If a metal constituent is not one of the TC metals, its presence cannot be the basis for determining if a waste exhibits the toxicity characteristic—but it could be an underlying hazardous constituent in the waste, in which case that constituent would need to meet the standard for that metal in today's rule before the waste could be land disposed.

a. Final Universal Treatment Standard for Nonwastewater Forms of Antimony. The Agency proposed in the Second Supplemental (62 FR 26041, May 12, 1997), to change the UTS for nonwastewaters containing antimony from 2.1 mg/L TCLP to 0.07 mg/L TCLP. This proposed change was a result of new data collection efforts conducted by the Agency to gather performance data that was representative of the diversity of metal-containing wastes.

In response, the Agency received several comments. Two commenters supported the proposed change; however the remaining commenters argued against the proposed level for antimony of 0.07 mg/L TCLP for a number of reasons. One commercial waste management facility stated that very few of the waste streams they treat using conventional stabilization techniques, including furnace ash, incinerator ash, scrubber brine sludge, furnace baghouse dust, and stripper rinse waters, would meet the proposed standard. The commenter submitted 48 data points supporting its claim. A third commenter stated that meeting the standard would significantly increase their compliance costs. Another stated that commercial stabilization techniques were not capable of meeting the proposed UTS for antimony. In general, these commenters suggested a higher UTS for antimony in the range of 1.3 mg/L TCLP to 2.98 mg/L TCLP.

In response to the commenters' concerns regarding the difficulty in treating antimony wastes, the Agency has conducted a thorough review of its BDAT data set and has determined that while it represents a diverse collection of waste streams containing metals, the concentration of antimony in the 9 data points used to calculate the proposed standard may not be representative of the most difficult to treat antimony waste. The data used by the Agency to calculate the proposed UTS of 0.07 mg/L TCLP, showed a range of antimony concentrations in the untreated waste of between 0.2440 mg/L TCLP and 16.1 mg/L TCLP. While the Agency, at the time, believed that these data were sufficient to establish a treatment standard, new data submitted by a commercial hazardous waste treatment facility provide a compelling argument to amend this standard. The new data consist of 48 additional data points representing various multiple metal waste streams, including incinerator or furnace ash, scrubber brine sludge, lab pack waste, stripper rinse water and baghouse dust. These wastes have all been treated with conventional stabilization techniques and meet the proposed UTS values for all metal constituents except for antimony. The Agency has reviewed the data, the treatment technology, and the QA/QC information submitted by the commenter and believes that the data should be incorporated into the existing BDAT data set. After doing so, the Agency recalculated the treatment standard for antimony nonwastewaters and is today promulgating a revised standard of 1.15 mg/L TCLP. All data available to the Agency indicate that the revised treatment standard for antimony nonwastewaters can be achieved by either stabilization or HTMR processes and addresses the commenter's concerns.

*b. Treatment Standard for Wastewater Forms of Arsenic Waste.*The Agency proposed in the original Phase IV proposal (60 FR 43683, August 22, 1995), to change the treatment standard for wastewater forms of toxicity characteristic arsenic (D004) waste from the characteristic level of 5.0 mg/L established in the Third Third rule (55 FR 22520 June 1, 1990) to the previously promulgated UTS for arsenic wastewaters of 1.4 mg/L. The Agency did not propose to change the treatment standard for nonwastewater forms of toxicity characteristic arsenic (D004) waste in that the UTS of 5.0 mg/L TCLP was the same as the TC level. The Agency received no comment on the proposed change to D004 wastewaters. Therefore, the Agency is today promulgating as proposed the UTS standard of 1.4 mg/L for D004 wastewaters.

c. Treatment Standards for Barium Waste. (i) Treatment standards for TC Barium (D005) Waste. In 60 FR 43684 (August 22, 1995), EPA proposed to change the treatment standards for wastewater forms of TC metal barium waste (D005) from the characteristic level of 100 mg/L (established in the Third Third rule, 55 FR 22520, June 1, 1990) to the previously promulgated UTS for barium of 1.2 mg/L. Likewise, EPA proposed for D005 nonwastewaters a change from the characteristic level of 100 mg/L TCLP (55 FR 22520, June 1, 1990) to the previously promulgated UTS of 7.6 mg/L TCLP. In support of these revised treatment standards, the Agency had performed a comprehensive re-evaluation of the available treatment performance data from wastes containing significant concentrations of barium.

For D005 wastewaters, the Agency determined that the existing UTS level for barium (1.2 mg/L) was appropriate, based on the performance of lime conditioning followed by sedimentation and filtration as BDAT. For D005 nonwastewaters, the Agency determined that the existing UTS level of 7.6 mg/L TCLP, based on treatment of barium in K061 (electric arc furnace dust) using HTMR was also appropriate. The Agency believed that these treatment standards could be routinely met by industry. Additionally, the Agency reviewed stabilization data and determined that the treatment standards for barium could be achieved by stabilization for a wide variety of waste matrices. (See Proposed Best Demonstrated Available Technology (BDAT) Background Document for Toxicity Characteristic Metal Wastes D004–D011, July 26, 1995.)

The Agency received no significant comment on the proposed change to the wastewater standard for D005. However, as previously discussed in Section III.A of today's rule, new data collection efforts and new analysis of BDAT data for nonwastewaters resulted in a reproposal of the barium treatment standard in the Phase IV Second Supplement (62 FR 26047) . In this notice, the Agency proposed to revise the treatment standard for barium nonwastewaters to 21 mg/L TCLP based on stabilization. The Agency received no comments in response to the reproposal. Therefore, the Agency today is promulgating a nonwastewater treatment standard of 21 mg/L TCLP as proposed in 62 FR 26041. In addition, the treatment standard of 1.2 mg/L for wastewater forms of D005 is promulgated as proposed in 60 FR 43654.

(ii) Universal Treatment Standard (UTS) for Barium Nonwastewaters. (Please refer to the discussion above about the development of the treatment standard for D005 for additional information on the development of the barium UTS levels.) The Agency proposed to change the UTS for barium nonwastewaters from 7.6 mg/L to 21 mg/L TCLP (see 62 FR 26041). It was proposed that such a treatment standard would better reflect the diversity of metal-containing waste streams and their treatment.

The Agency received no significant comment in response to the reproposal. Therefore, the Agency is today promulgating a nonwastewater UTS of 21 mg/L TCLP, as proposed.

d. Final Universal Treatment Standard for Nonwastewater Forms of Beryllium Waste. The Agency proposed in the original Phase IV proposal (60 FR 43683, August 22, 1995), to revise the UTS for nonwastewaters containing beryllium from 0.014 mg/L TCLP to 0.04 mg/L TCLP. As previously discussed, new data collection efforts and new analysis of BDAT data resulted in a reproposal of the beryllium treatment standard to 0.02 mg/L TCLP in the Phase IV Second Supplemental (62 FR 26041, May 12, 1997).

The Agency received numerous comments on the proposed revision. One commenter supported the proposed treatment level for beryllium, but stated that current stabilization technologies could achieve lower treatment levels. Several other commenters stated that while the proposed standard for beryllium was consistent with the data considered by the Agency, the stabilization data for beryllium were quite limited and reflected the treatment of wastes having very low beryllium content. Commenters further questioned whether the proposed standard of 0.02 mg/L TCLP could be met by conventional stabilization techniques if higher concentrations of beryllium were treated. Other commenters stated that they could not support the treatment standards because EPA has not demonstrated that existing commercial technologies were capable of achieving the proposed standards or that technologies were otherwise available.

In light of the comments received, the Agency conducted a review of the data set used to calculate the proposed standard. The review indicated that, consistent with the commenter's concerns, the data used by the Agency to calculate the standard were based on wastes containing low concentrations of beryllium (between 0.0050 and 0.5 mg/L TCLP). These concentration levels and the subsequent treatment standard developed from them does not appear to adequately account for the difficulty in treating wastes containing higher concentrations of beryllium. Data generated and submitted by Brush Wellman, Inc., consisting of seven data points, showed characteristic wastes (D008) with concentrations of beryllium ranging from 32 to 95 mg/L TCLP. When treated with conventional stabilization techniques, treatment resulted in beryllium levels ranging from 0.05 mg/L to 0.31 mg/L TCLP. As a result of these data, the proposed UTS for beryllium must be revised to reflect a more difficult-to-treat or high-concentration beryllium waste. Accordingly, the Agency is today promulgating a revised UTS for beryllium nonwastewaters of 1.22 mg/L based on this newly acquired data. All treatment performance data available to the Agency indicates that this revised treatment standard can be met, thereby addressing concerns raised by the commenters to the proposal. It should be noted that the UTS for beryllium wastewaters remains unchanged at 0.82 mg/L.

e. Treatment Standards for Cadmium Wastes. (i) Treatment standards for TC Cadmium (D006) Waste. The Agency proposed to change the treatment standards for wastewater forms of TC cadmium (D006) waste from the characteristic level of 1.0 mg/L (established in the Third Third rule (55 FR 22520. June 1, 1990) to the previously promulgated UTS for cadmium wastewaters of 0.69 mg/L. EPA also proposed to change the treatment standard for D006 nonwastewaters from the characteristic level of 1.0 mg/L TCLP (55 FR 22520 (June 1,1990)) to the previously promulgated UTS for cadmium nonwastewaters of 0.19 mg/L TCLP. In support of these revised treatment standards, the Agency had performed a comprehensive re-evaluation of the available treatment performance data from wastes containing significant concentrations of cadmium.

For D006 wastewaters, the Agency determined that the existing UTS for cadmium (0.69 mg/L) based on a BDAT of lime conditioning followed by sedimentation was appropriate. The treatment standard for nonwastewater forms of D006 wastes was based on a transfer from the UTS for cadmium of 0.19 mg/L TCLP based on the K061–HTMR treatment standard data. The Agency chose to use these data because they represented performance of an HTMR treatment unit. The UTS based on K061–HTMR could be routinely met by industry. Additionally the Agency reviewed stabilization performance data and determined that the UTS for cadmium could be achieved by stabilization for a wide variety of waste matrices. See Proposed Best Demonstrated Available Technology (BDAT) Background Document for Toxicity Characteristic Metal Waste D004–D011 (July 26, 1995).

The Agency received no comments on the proposed change to the wastewater standard for D006. However, for reasons previously discussed in Section III.A of today's preamble, the Agency in the Phase IV Second Supplemental proposed to revise the treatment standard for cadmium nonwastewaters to 0.20 mg/L TCLP based on HTMR.

All comments received in response to the revised standard for cadmium supported the change. However, as discussed earlier in Section III.A of today's preamble, the Agency discovered an error in the calculation of the treatment standard. In applying the LDR methodology for calculating a treatment standard, the Agency failed to conduct a ''Z-score'' outlier test. With the application of this test, 2 out of the 40 data points were determined to be outliers, resulting in a revised treatment standard for cadmium nonwastewaters of 0.11 mg/L TCLP. (The proposed treatment standard of 0.20 mg/L TCLP was based on all 40 data points.) The Agency has reviewed the comments in light of this amended treatment standard and believes that it can be achieved by both HTMR and stabilization treatment. Data submitted by commenters in support of this rule does clearly indicate that the standard can be achieved. See supporting information contained in docket for this rule. Therefore, the Agency is today promulgating a nonwastewater treatment standard of 0.11 mg/L TCLP for D006. In addition, the treatment standard of 0.69 mg/L for wastewater forms of D006 waste is being promulgated as proposed in 60 FR 43654.

(ii) Universal Treatment Standard (UTS) for Nonwastewaters Containing Cadmium. The reader is referred to the above discussion about the development of the treatment standard for D006 nonwastewaters for additional information of the development of the UTS level for cadmium nonwastewaters. EPA is promulgating an UTS of 0.11 mg/L TCLP for nonwastewaters containing cadmium. No change was proposed for the cadmium wastewater UTS; therefore it remains at 0.69 mg/L.

f. Treatment Standards for Chromium Wastes. (i) Treatment Standards for TC Chromium Wastes (D007). In 60 FR 43654 (August 22, 1995), the Agency proposed to change the treatment standards for wastewater forms of toxicity characteristic chromium (D007) waste from the characteristic level of 5.0 mg/L (established in the Third Third rule (55 FR 22520. June 1, 1990) to the previously promulgated UTS for chromium (total) wastewaters of 2.77 mg/L. EPA also proposed to change the treatment standards for D007 nonwastewaters from the characteristic level of 5.0 mg/L TCLP (55 FR 22520, June 1,1990) (a standard remanded by the D.C. Circuit as insufficiently stringent in *Chemical Waste Management v. EPA*, 976 F. 2d at 32) to the previously promulgated UTS for nonwastewater forms of chromium (total) of 0.86 mg/L TCLP. In support of these revised standards, the Agency had performed a comprehensive re-evaluation of the available treatment performance data from wastes containing significant concentrations of chromium.

For D007 wastewaters, the Agency determined that the existing UTS (2.77 mg/L) based on a BDAT of lime conditioning followed by sedimentation was appropriate. The treatment standard for D007 nonwastewaters was based on a transfer from the UTS for chromium (total) of 0.86 mg/L TCLP based on the K061–HTMR treatment standard data. In addition, the Agency reviewed stabilization performance data and determined that the UTS for chromium (total) could be achieved by stabilization for a wide variety of waste matrices. See Proposed Best Demonstrated Available Technology (BDAT) Background Document for Toxicity Characteristic Wastes D004–D011, July 26, 1995.

The Agency received no comments on the proposed change to the wastewater standard for D007. However, as previously discussed in Section III.A of today's preamble, new data collection efforts and further analysis of BDAT data, resulted in a proposed revision to the treatment standard for nonwastewater containing chromium to 0.85 mg/L TCLP based on a BDAT of stabilization (62 FR 26041).

In response to the reproposal, the Agency received no significant comments. However, as discussed earlier in Section III.A of today's preamble, the Agency discovered an error in the calculation of the treatment standard. In applying the LDR methodology for calculating a treatment standard, the Agency failed to conduct a ''Z-score'' outlier test. With the application of this test, 2 out of the 40 data points, originally used to calculate the standard, were determined to be outliers, resulting in a revised treatment standard for chromium nonwastewaters of 0.60 mg/L TCLP. The Agency has reviewed the comments in light of this amended standard and believes that it can be achieved by both HTMR and stabilization technologies. Data submitted by commenters in response to this proposal also support this conclusion. See supporting information contained in the docket for this rule. Therefore, the Agency is today promulgating an amended nonwastewater treatment standard of 0.60 mg/L TCLP. In addition, EPA is also promulgating a treatment standard of 2.77 mg/L for wastewater forms of D007 as proposed in 60 FR 43654.

(ii) Universal Treatment Standard (UTS) for Chromium Nonwastewaters. (Please refer to the discussion above about the development of the treatment standard for D007 for additional information on the development of the chromium UTS levels.) The Agency proposed to change the UTS for chromium (total) nonwastewaters to 0.85 mg/L TCLP to better reflect the diversity of metal-containing waste streams and their treatment (see 62 FR 26041). No change was proposed for the chromium wastewater UTS.

The Agency received no significant comments on the reproposal. However, as a result of an error in the calculation of the proposed treatment standard, as previously discussed, the Agency is today promulgating a revised chromium nonwastewater UTS of 0.60 mg/L TCLP. The chromium wastewater UTS remains unchanged at 2.77 mg/L.

g. Final Treatment Standards for Lead Wastes. (i) Treatment standards for TC Lead Wastes (D008). In 60 FR 43654 (August 22, 1995), the Agency proposed to change the treatment standards for wastewater forms of toxicity characteristic lead (D008) waste from the characteristic level of 5.0 mg/L established in the Third Third rule (55 FR 22520, June 1, 1990) to the previously promulgated UTS for lead wastewaters of 0.69 mg/L. EPA also proposed to change the treatment standard for D008 nonwastewaters from the characteristic level of 5.0 mg/L TCLP (55 FR 22520, June 1, 1990) (a standard remanded by the D.C. Circuit as insufficiently stringent in *Chemical Waste Management v. EPA*, 976 F. 2d at 27) to the previously promulgated UTS for lead nonwastewaters of 0.37 mg/L TCLP. In support of these revised treatment standards, the Agency had performed a comprehensive re-evaluation of the available treatment performance data from wastes containing significant concentrations of lead.

For D008 wastewaters, the Agency determined that the existing UTS for lead (0.69 mg/L) based on a BDAT of lime conditioning followed by sedimentation was appropriate. The treatment standard for nonwastewater forms of D008 waste was based on a transfer from the UTS for lead of 0.37 mg/L TCLP, which in turn, was based on K061–HTMR treatment standard data. The Agency believed that the UTS could be routinely met by industry using HTMR. Additionally, the Agency reviewed stabilization performance data and determined that the UTS for lead could also be achieved by stabilization for a wide variety of waste matrices. See Proposed Best Demonstrated Available Technology (BDAT) Background Document for Toxicity Characteristic Metal Wastes D004–D011, July 26, 1995.

The Agency did not receive any comments on the proposed change for D008 wastewaters. However as previously discussed in today's preamble, numerous comments on the proposed nonwastewater treatment standard were submitted. 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 (62 FR 26047) collected by the Agency. The Agency felt that these data better reflected the diversity of lead-containing waste streams and their treatment.

Numerous commenters concurred with the Agency's reproposal. However, other commenters, specifically those representing various sectors of the secondary lead industry, argued that EPA's proposed treatment standard for lead was not achievable. In particular, comments from Battery Council International (BCI) and the Association of Battery Recyclers (ABR) argued that new data developed by their association members showed that no facility in the secondary lead industry could meet EPA's proposed treatment standard for lead. Instead, they supported setting a treatment standard of 8.39 mg/L TCLP for D008 nonwastewaters based on stabilization. The commenters argued that smelter slag has chemical and physical characteristics distinctly different from the wastes used to develop the treatment standard and that because of its physical variability, treatment of secondary smelter slag through stabilization was much less effective than other types of D008 wastes. The commenter further questioned EPA's decision to ignore data submitted by BCI, ABR and others in response to the original Phase IV proposal, stating that these data were much more comprehensive and representative. The commenter stated that these data contained 276 composite data points for lead from secondary smelter slag, with a 99th percentile confidence interval for stabilized slag of 2.97 mg/L TCLP. Another commenter, which uses a chemical fixation process on the generated blast furnace slag, argued that they could only meet a 2.0 mg/L TCLP for lead, based on composite rather than grab sampling.

In response to the commenters' concerns, the Agency would first like to respond to the commenters' statement that data previously submitted to the Agency was ignored. The Agency is careful to review and analyze all data that are submitted in support or response to its rulemakings. In fact, the referenced data were analyzed extensively, but were found to be so seriously lacking in form and quality assurance/quality control prerequisites that it was impossible to use them for BDAT development. (In the docket for this rule see the documents, ''Draft—Overview of Five Data Sets Submitted in Response to the Land Disposal Restrictions Phase IV Proposed Rule: Treatment of Metals,'' November 1996; and correspondence from Michael Petruska, USEPA to David B. Weinberg, Battery Council International Re: Request for Additional Data in Support of the Previous Submitted Data in Response to the Land Disposal Restriction Phase IV,'' July 22, 1996). Specifically, the data submitted to the Agency were (1) based on composite samples rather than grab samples, the latter being the only type used to develop treatment standards; (2) lacking in any quality assurance/quality control (QA/QC) documentation; and (3) not accompanied with specific treatment information, or any indication that performance of the treatment process was in fact optimized. As such, the Agency was unable to utilize these data.

Other additional data were subsequently submitted by the commenter in response to the ''Second Supplemental'' and analyzed by the Agency. These data were based on grab sampling, but there were no specifics on the type of stabilization treatment conducted on the waste. The data does indicate that secondary smelter slags can be treated to meet today's treatment standards for all metals except lead and thallium. With respect to lead, approximately 24 out of 83 samples have treated lead values greater than 0.75 mg/L TCLP, but less than the characteristic level of 5.0 mg/L TCLP. No information was provided for the majority of the thallium data sets. Based on these data, the commenter proposed a treatment standard of 8.39 mg/L TCLP for lead nonwastewaters and 0.79 mg/L TCLP for thallium nonwastewaters. However, these data failed to show effective treatment of the thallium and lead constituents. (In the docket for this rule, see memorandum to Nick Vizzone, USEPA from Howard Finkel of ICF, ''Calculation of Universal Treatment Standard (UTS) for Stabilized Secondary Lead Slag Using Data Submitted by the Battery Council International and Association of Battery Recyclers,'' December 5, 1997).

Commenters have failed to provide reliable and convincing data or information to persuade the Agency that stabilization can not meet the proposed treatment standard of 0.75 mg/L TCLP for lead slags. While the physical variability of the slag may indeed affect treatment performance, the Agency is unconvinced that the commenter's data were the result of optimized treatment conditions and, therefore, are not indicative of true treatment difficulties. EPA's own performance data from treatment of D008 battery slags (which were used in part for the calculation of the treatment standard) clearly support the view that slags from secondary battery recyclers can be treated to meet the nonwastewater standard of 0.75 mg/L TCLP. These data indicate that slags with lead concentrations ranging from 5 to 846 mg/L TCLP (a range similar to that associated with the data submitted in response to the May 12 Second Supplemental proposal and which are discussed above) can be treated with stabilization techniques to levels less than 0.01 mg/L to 0.3 mg/L TCLP. Furthermore, data and information available to the Agency suggest that with optimized treatment these standards should be achievable regardless of the waste matrix. (See ''Treatment Technology Background Document'', January 1991, for a discussion of Waste Characteristics Affecting Performance (WCAPS and other pertinent material). As such, the Agency is unpersuaded by the commenter's arguments and is today promulgating as proposed a treatment standard of 0.75 mg/L TCLP for D008 nonwastewaters and a standard of 0.69 mg/L for D008 wastewaters. The Agency notes that if a particular waste is unique or possesses properties making it unusually difficult to treat by the treatment technologies whose performance was used to develop the treatment standard, the affected party may petition the Agency, on a case-by-case basis, for a treatment variance as provided in 40 CFR 268.44.

(ii) Final Universal Treatment Standard (UTS) for Nonwastewaters Containing Lead. (Please refer to the discussion above about the development of the treatment standard for D008 for additional information on the development of the lead UTS levels.) The Agency proposed to change the UTS for lead nonwastewaters from 0.37 mg/L TCLP to 0.75 mg/L TCLP to better reflect the diversity of metal-containing waste streams and their treatment (see 62 FR 26041). In response to the proposed revision, the Agency did receive a number of comments on the nonwastewater level, discussed above. For reasons also discussed above, the Agency is today promulgating a lead nonwastewater UTS of 0.75 mg/L TCLP as proposed.

(iii) Secondary Smelter Battery Slag—Additional Issue. EPA published a Notice of Data Availability (NODA) on May 10, 1996 (61 FR 21419) that discussed, among other things, an issue regarding application of the LDR standards to slags resulting from the smelting of lead acid batteries. The LDR treatment standard, established in the Third Third Rule in 1990, for lead acid batteries is RLEAD (see 40 CFR 268.40 and 268.42, Table 1), which means recovery of lead. The NODA stated that ''[o]nce the batteries are smelted, the LDR requirements have been satisfied, and, therefore, the slag resulting from this smelting need not be treated further. The standards proposed under Phase IV (i.e., compliance with UTS) would not apply to this slag, even if the slag exhibits a characteristic of hazardous waste (i.e., contains lead in amounts greater than 5.0 mg/L).'' This position was based on EPA's usual interpretation that ''when EPA specifies a treatment method as the treatment standard, residues resulting from the required treatment method are no longer prohibited from land disposal *unless EPA should otherwise specify*.'' (emphasis added) 55 FR at 22538 (June 1, 1990).

After the publication of the May 10, 1996 NODA, EPA realized that it had, in fact, ''otherwise specified'' that lead slags resulting from the smelting of lead acid batteries would be a separate treatability group in the Third Third rule, and they would indeed require further treatment if the slags exceeded the TC for lead (5.0 mg/L) as generated. See 55 FR at 22568 (June 1, 1990). The Third Third rule states that ''The residuals from the recovery process are a new treatability group (i.e., the residues are not lead acid batteries) and, therefore, their status as prohibited or nonprohibited is determined at the point the residues are generated. Such residues would thus only be prohibited and therefore require further treatment if they exhibit a characteristic.'' This point was clarified both in person and in a letter, dated July 31, 1996, sent to representatives of Battery Council International. The letter explained that the Agency had mischaracterized the status of lead slags in the May 10, 1996 NODA and requested comment on the appropriate treatment standard for these lead slags.

EPA published the Phase IV Second Supplemental Proposed Rule on May 12, 1997, and among other things, used new data from the treatment of lead slags in revising the treatment standards for lead. In response to this issue, one commenter stated that EPA was prohibited under RCRA 3004(m) from requiring further treatment for residuals that resulted from a treatment process that was determined to be BDAT (such as RLEAD). The commenter believes RCRA 3004(m) states that once threats are minimized, EPA cannot require further treatment of the residuals after the specified BDAT treatment has been performed on the waste, or the BDAT numerical level has been achieved. Because the Agency's data on lead slag residuals show concentrations of 283 mg/L TCLP lead are not uncommon, potential threats from treated lead slag (using RLEAD only) are clearly not minimized. In fact, the concentrations of lead in these residuals resulting from RLEAD of lead acid batteries are among the most concentrated TC lead wastes for which the Agency has data. The Agency only is requiring further treatment of slag residuals which exhibit the characteristic for lead (i.e., contain lead in amounts greater than the TC level of 5.0 mg/l). Those residuals, by definition, are still hazardous and potential threats posed by their land disposal have not been minimized.

Another commenter raised the issue of whether there had been adequate notice and comment given regarding the status of lead slag residuals. The Agency believes that adequate notice and opportunity to comment were given in light of the facts recited. We note also that all comments received on the Phase IV second supplemental rule regarding lead slag residuals took issue with the treatment standard for lead and the data used to develop the standard, but did not question that the slags could be required to be treated further. Commenters appeared to clearly understand that slags are covered by the Phase IV rule establishing standards for TC lead wastes.

Therefore, lead slag residuals resulting from the smelting of lead acid batteries are included under today's rulemaking. If such residuals exhibit a lead toxicity characteristic (i.e., have lead levels exceeding 5.0 mg/L) after RLEAD is employed, they would have to be treated again for lead and any other underlying hazardous constituents present in waste until the treatment standards are achieved. For a discussion on the development of these numerical standards being promulgated today; see the discussion in section (i) above.

(iv) Addition of Iron Filings to Stabilize Lead-Containing Wastes. Today, the Agency is codifying the principle that the addition of iron metal, in the form of fines, filings, or dust, for the purpose of ostensibly achieving a treatment standard for lead is ''impermissible dilution'' under 40 CFR 268.3. The Agency has determined that this waste management practice does not minimize threats posed by land disposal of lead-containing hazardous waste because the practice essentially ''blinds'' the analytic method but would not in fact prevent lead from leaching under actual disposal conditions. Affected wastes include: toxic characteristic lead wastes (D008), any characteristic waste containing lead as an underlying hazardous constituent, and listed wastes for which lead is regulated.

On March 2, 1995, EPA published the LDR Phase III proposal (60 FR 11702). Among other things EPA proposed that the addition of iron dust to stabilize lead in characteristic hazardous waste constituted impermissible dilution, rather than treatment legitimately meeting the LDR treatment standards (60 FR 11731). In the proposal, the Agency stated that certain industries were adding iron dust or iron fines to some characteristic hazardous waste (nonwastewaters) as an ostensible form of treatment for lead. As an example, the Agency noted that foundries were known to mix iron dust or filings with the D008 sand generated from their spent casting molds, viewing this practice as a form of stabilization. In the proposal, the Agency stated that such stabilization practices were inadequate to minimize threats posed by land disposal of metal-containing hazardous waste, and proposed to clarify that waste management practice as ''impermissible dilution'' under 40 CFR 268.3.

In response to the proposal, the Agency received numerous comments. Commenters in support of the ''impermissible dilution'' designation agreed with EPA's discussion in the preamble that no chemical or pozzolanic reaction was possible from iron dust or filings and that standard chemistry showed that metals such as lead were not bound in a non-leachable matrix when using iron dust or filings as a stabilizing agent. One commenter further mentioned many instances where generators have avoided treatment costs by adding iron to their metal and cyanide-bearing waste streams, thus providing the short-term ability to, as the commenter stated, ''fool'' the test for both amenable cyanide and leachable metals. The commenter pointed out that EPA's adoption of a total cyanide treatment standard had essentially solved the issue of ineffective treatment of cyanide using iron, but the issue of metals treatment still remained. The commenter concluded that the prohibition on the use of iron dust and filings would promote more treatment of toxic metal-bearing wastes.

Other commenters discussed analytical concerns with the TCLP test when used on iron-treated wastes. One commenter stated that the addition of iron to D008 waste sand may mask the presence of lead in two ways: first, iron is more easily oxidized than lead so that under the conditions of the TCLP test, iron may be preferentially leached out into solution, leaving the lead in an insoluble, undetectable state. A second problem with the presence of iron in the TCLP test is spectral interference with the analysis of lead, which could result in positive interference and a raised detection limit for lead.

Numerous commenters representing the foundry industry, however, argued extensively against the ''impermissible dilution'' designation for iron treatment of characteristic metal wastes. The commenters stated that EPA's position was neither justified nor supported by any technical documentation. The commenters further stated that: (1) iron added to lead bearing waste foundry sand effectively immobilizes the lead and yields a treatment residue that consistently passes the TCLP; (2) TCLP tests, run on foundry sand that was treated with iron and landfilled 8–10 years ago, yielded lead results below the 5 ppm level; (3) analytical results for total iron from landfill samples clearly show the iron has not oxidized after several years; and (4) iron treatment has long-term stability. The commenters further stated that no evidence either from leaching tests or from real-world experience showed that iron treatment is not a successful long-term treatment for brass foundry sand when the treatment is conducted in an appropriate manner. On March 5, 1997, the Agency addressed the issue and industry arguments in Land Disposal Restriction—Phase IV Treatment Standards for Characteristic Metal Wastes; Notice of Data Availability (NODA) (62 FR 10004). In this NODA, new studies and data were presented on the issue of the treatment adequacy of adding iron to characteristic metal wastes as a method of treatment. As explained in the Phase III proposed rule (60 FR 11702), and again in the NODA of March 5, 1997, the addition of iron seems to temporarily retard the leachability of lead in spent foundry sand, thus allowing the waste to pass the TCLP test, but not to be permanently treated. At the time of the Phase III final rule, EPA decided not to finalize a determination that the practice was a form of impermissible dilution in the Phase III final rule without studying the issue further. See 61 FR 15569, April 8, 1996. In the March 5, 1997 NODA, two studies were noticed that had recently been completed.

One study was developed by Dr. John Drexler of the University of Colorado and the other by Dr. Douglas Kendall of the National Enforcement Investigation Center (NEIC). The results of these studies indicated that the addition of iron filings or iron dust to spent foundry sands (D008) did not constitute adequate treatment of the waste because high concentrations of lead remained available to the environment and indeed have been shown to leach in actual field testing of units receiving the spent foundry wastes. (The reader is referred to 62 FR 10004, March 5, 1997 for a full discussion of the studies).

Specifically, Dr. Drexler's study concluded: (1) the spent foundry wastes placed in Nacodoches Municipal Landfill remained hazardous; (2) the addition of iron filings to spent foundry sand does not cause chemical reduction (i.e., the hazardous lead remains oxidized); (3) the addition of iron filings to the spent foundry sand promoted a physicochemical dilution of the sample during the TCLP by producing significant increases in surface area sorption sites; (4) the addition of iron filings to the waste artificially altered the environmental character of the TCLP test by increasing pH and lowering Eh (redox potential) and DO (dissolved oxygen); and (5) in-vitro testing shows that these ''treated'' wastes maintain a high bioavailability of lead.

Dr. Kendall's study concluded that the addition of iron is not a permanent way to treat lead-contaminated waste. Specifically, he concluded that: (1) no reaction occurs when metallic iron is mixed with lead-contaminated foundry sand (D008); (2) during the TCLP process, lead begins to leach into the solution and if metallic iron is present, the lead concentration in solution will decrease by an oxidation/reduction reaction to levels below the lead characteristic; (3) only if fresh metallic iron is regularly introduced into the mixture, can soluble lead be kept at low levels; and (4) upon placement of the waste in a landfill and left alone, the iron will oxidize, losing its ability to reduce lead ions.

Peer review of the studies concurred with the findings that the addition of iron filings to spent foundry sand is not treatment of hazardous waste and that the scientific data presented in the studies were based on sound scientific research and support the conclusions made. (See ''Peer Review Report, September 3, 1996, submitted by A.T. Kearney, Inc., Dallas, Texas to Rena McClurg, Regional Project Officer, USEPA, Dallas, Texas.)

The Agency received several comments in response to the NODA. One State agency commented that based on the evidence gathered by the EPA, the addition of iron fines as treatment of lead containing wastes appears to be unacceptable under most disposal criteria. Furthermore, it was the commenter's contention that the method in question should be rejected where disposal of wastes so treated may be subjected to acid leaching and chemical oxidation, in particular disposing of wastes in a municipal solid waste landfill. The commenter did note however that data exist to support the contention that the treatment may be acceptable for brass foundries under specified monofill disposal criteria. Another commenter requested clarification as to whether iron-bearing lead waste products, i.e., from the steel bridge blast cleaning and painting industry, would be impacted. The commenter recommended that all waste debris from any lead abatement project be deemed hazardous and treated appropriately regardless of the type of abrasive blast media used.

Two commenters argued that the conclusions drawn from the studies conducted by Drs. Kendall and Drexler were erroneous or misplaced from a regulatory standpoint. In particular the commenters argued, among other things, that given the biased sampling, i.e., sampling of only ''hot spots'' in the landfill and disregard for SW–846 statistical analysis, EPA should reconsider its view on the treatment of foundry sands with iron filings. (The reader is referred to the ''Comment Response Document'' for this final rule for a more complete discussion of the comments received on this issue.)

EPA has evaluated all the comments on the subject studies and on the issue of iron filings as a treatment method for lead nonwastewaters. The regulatory issue at hand—and the focus of the studies—is whether or not adding iron metal is adequate treatment for LDR purposes. Several commenters have elected to take issue with points that are not the central focus of the two studies. While a statistical evaluation is used to determine if a waste is hazardous, all parts of the waste must be treated to meet the applicable standards, not just a representative sample. Thus, if results show that ''hot spots'' remain, this is presumptive evidence that treatment was not effective and there is noncompliance with the LDR treatment requirements. In the preceding determination of whether a waste is hazardous, the Agency guidance in SW–846 provides basic sampling strategies for simple and stratified random sampling of the waste as a whole. However, in application of the land disposal treatment standards, all portions of the waste must meet the applicable treatment standards, i.e., no portion may exceed the regulatory limit. See 40 CFR 268.40. Hence, commenters that focused on the SW–846 sampling issue largely misconstrued the central findings of the studies.

In response to comments pointing to the disposal of a waste in a monofill, while data may suggest that disposal of iron treated waste in this type of controlled environment may be protective in some scenarios, RCRA section 3004(m)(1) requires treatment to substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized. This statutory requirement has not been met with iron addition plus placement in a monofill since ultimate placement of the waste in a monofill is not germane to the key issue at hand—is the treatment prior to land placement effective.

With respect to this key issue, the Agency's determination that the addition of elemental iron in the form of fines, filings, etc., constitutes impermissible dilution is predicated on the fact that the adsorption of soluble lead on to the iron surface is a reversible reaction and once the iron surfaces oxidize (which naturally occurs when the treated waste is exposed to air), the ability of the additive (iron) to scavenge soluble metals is diminished. Therefore, the treatment is not permanent. In addition, adsorption alone is not a reliable method of permanently immobilizing lead which both studies conclude. The authors have also concluded, and the Agency agrees, that the prohibition should apply to any lead-containing waste. As stated by Dr. Kendall in his response to comments, ''Lead-contaminated foundry sand is no different from any other waste which fails the TCLP test because of excessive amount of extractable lead. The addition of iron metal (zero valence iron) is not a permanent treatment because iron oxidizes. Since iron addition is not a permanent treatment, it should not be allowed for hazardous wastes which are to be land disposed, regardless of their origin.'' (See memorandum from Samuel Coleman, USEPA to James R. Berlow, USEPA Re: ''Reply to Comments Concerning Prohibition of Land Disposal of Iron Treated Lead Contaminated Wastes''. November 17, 1997.)

As indicated above, the addition of iron metal is not a permanent treatment because the iron inevitably oxidizes and loses its adsorptivity for soluble lead ions. After oxidation of the iron surfaces, surface adsorption of lead ions ceases and the lead-bearing waste returns to its original state; all pretext of treatment is lost. Since iron addition is not effective, it cannot be allowed for hazardous lead-containing hazardous wastes that are to be land disposed, regardless of their origin (i.e., all lead-bearing wastes, not just foundry sands).

The Agency concludes that addition of iron metal, in the form of fines, filings, or dust, fails to provide long-term treatment for lead-containing hazardous wastes. EPA is codifying this determination by calling the practice impermissible dilution, and so invalidating it as a means of treating lead in lead-containing hazardous wastes. It can also be simply viewed as a type of treatment that fails to minimize the threats to human health and the environment posed by disposal of lead-containing hazardous wastes, because lead mobility is not substantially reduced when the waste is disposed.

In response to comments whether use of iron-containing abrasives to remove lead-based paint, for example from the steel bridge blast cleaning and painting industry, may be a type of impermissible dilution, the Agency notes that the dilution prohibition does not apply to processes which generate a waste, only to processes that treat a waste which already has been generated. See S. Rep. No. 284, 98th Cong. 2d Sess. 17 (1984). As such, it would not appear that abrasive blasting is impermissible dilution since it is part of the process generating the waste, i.e., the removed paint. If generators added iron filings/dust or discarded, off specification steel shots to lead-based paint waste (similar to the current foundry practices), it is analogous to impermissible dilution and this rule bans such practice. However, addition of iron filing/dust to a hazardous waste (before the hazardous waste determination) is a lot different from using steel pellets/shots, silica-containing products, and other abrasive materials for paint removal.

The Agency has been pursuing several specific efforts to evaluate the environmental hazards caused by disposal of lead-containing wastes, including evaluation of damage case information included in the 1996 Hazardous Waste Characteristic Scoping Study, re-examination of the risk modeling used for the 1995-proposed Hazardous Waste Identification rule, and evaluation of fate and transport in other environmental media from industrial nonhazardous solid waste disposal facilities. Upon completion of these activities, the Agency will be in a better position to decide whether disposal of lead-containing waste is a health and environmental concern warranting listing or whether revising the TC regulatory limit would be more appropriate.

In addition, the Agency notes that a determination that a waste is not hazardous (here because addition of iron during a generating process results in a determination that paint waste does not exhibit a characteristic) may not be a shield against future liability, if the disposal results in environmental damage. Note that under CERCLA, not just generators are liable for any environmental damage caused by the release of hazardous material into the environment. CERCLA liability is independent of any hazardous waste determination that previously may have been made. EPA believes that in light of CERCLA liability and the available environmental contamination data, it would be prudent for generators to examine their waste generation and management practices with an eye toward segregation of lead-based paint waste and iron dust/flakes or steel shots, and potential re-smelting of the lead-bearing residuals.

As a final matter, it has been argued to the Agency that the proposed (and now final) action regarding addition of iron filings is analogous to treatment of fluoride in a process for treating aluminum spent potliner waste (K088) operated by Reynolds Metals Company. See generally Docket P33F–S0069 p. 6 (July 7, 1997) and 62 FR 37694, 37697 (July 14, 1997) (responding to comment and establishing October 8, 1997 as the date prohibition of land disposal of K088 wastes takes effect). The argument goes that in the Reynolds treatment process, reagents are added to the process that only allow the fluoride to meet the LDR treatment standard by blinding the analytical method (the TCLP), but do not result in permanent reduction of fluoride mobility in the treated wastes. See 62 FR at 37695, noting that levels of fluoride in the leachate from actual disposal are well in excess of the levels established in the treatment standard (as measured by the TCLP). Hence, it is asserted, this process must be an example of impermissible dilution.

The Agency disagrees. First, EPA calculated that the process did reduce fluoride mobility on the order of 28%. Docket P33F–S0064. This estimate may in fact understate the extent of treatment. The maximum amount of fluoride detected in actual leachate from the disposed treatment residue is 2228 mg/L. 62 FR 37695. However, untreated potliners leached fluoride at concentrations ranging from 7730–8860 mg/L when exposed to the same type of leaching medium (simulated monofill leaching medium). Docket P33F–S0049 data set J. Thus, EPA finds that the process is resulting in non-dilutive treatment of fluoride. In addition, the reagent used for fluoride treatment serves another legitimate function in the process—as a fluxing agent to prevent agglomeration of material in the rotary kiln. 62 FR at 37695. Dilution which is a necessary part of a treatment process is normally permissible. 51 FR at 40592 (November 7, 1986); 62 FR at 37697. Consequently, EPA does not regard the treatment of fluoride in the Reynolds K088 treatment process to be a form of impermissible dilution.

h. Treatment Standards for Wastewater and Nonwastewater Forms of Mercury Waste. The Agency, in the original Phase IV rule, proposed to change the treatment standard for one subcategory of TC mercury wastewaters (D009—All Others) from the characteristic level of 0.20 mg/L (established in the Third Third rule (55 FR 22520. June 1, 1990) to the previously promulgated UTS for mercury wastewaters (Mercury—All

Others) of 0.15 mg/L. (60 FR 43654, August 22, 1995.) The Agency received no comments on this proposed change. As such, the Agency is promulgating a treatment standard of 0.15 mg/L for wastewater forms of D009—All Others.

The Agency also proposed to revise the treatment standard for TC mercury nonwastewaters (D009—All Others) from the characteristic level of 0.20 mg/L TCLP to 0.025 mg/L TCLP. The nonwastewater UTS for mercury is based on the mercury standard developed from K071 waste treatment data. The only comments received on the achievability of this proposed change were regarding the application of this treatment standard to TC mercury soil. TC soils are subject to specific treatment standards being finalized elsewhere in today's rule. More detail can be found on the mercury soil comments in the Response to Comments Background Document. Therefore, the Agency is promulgating a treatment standard of 0.025 mg/L TCLP for nonwastewater forms of D009—All Others in today's rule.

With respect to the broader issue of mercury treatment, the Agency plans to conduct an intensive review of traditional and innovative technologies over the next year or so. Outreach to various industry, academic, and other groups is also being investigated as to its feasibility. Key information, when available, on this effort can be obtained from the RCRA Hotline, and notices of significant public events will be placed in the **Federal Register** and on EPA's Internet home page.

i. Final Universal Treatment Standard for Nonwastewater Forms of Nickel. The Agency proposed in the Phase IV Second Supplemental to change the UTS for nonwastewaters containing nickel from 5.0 mg/L TCLP to 13.6 mg/L TCLP. This revision to the UTS was based on new performance data obtained by the Agency and presented in that notice. The Agency did not receive any significant comments on this issue. However, as discussed in an earlier section of today's preamble, the Agency discovered an error in the calculation of the treatment standard. In applying the LDR methodology for calculation of a treatment standard, the Agency failed to conduct a ''Z-score'' outlier test. With the application of this test, 5 out of the 122 data points originally used in the calculation of the standard, were determined to be outliers. This error resulted in a revised treatment standard for nickel nonwastewaters of 11.0 mg/L TCLP. In light of this amended standard, the Agency has reviewed all of the comments and data submittals, and has determined that all the treatment data for nickel is below 11.0 mg/L TCLP. Accordingly, the Agency is today promulgating a final UTS for nickel nonwastewaters of 11.0 mg/L TCLP. No change was proposed for nickel wastewater; therefore, the UTS remains at 3.98 mg/L for these wastes.

j. Final Treatment Standards for Selenium Wastes. (i) Treatment standards for TC Selenium Wastes (D010). The majority of commenters supported the Agency proposal to maintain the 5.7 mg/L TCLP level for D010 nonwastewaters. They strongly agreed with the Agency's reasoning, and urged EPA to adopt the proposed treatment standard.

One commenter, however, 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 has cited technical problems in achieving the proposed treatment standard level for highly contaminated selenium wastes. The commenter states that, since 1995, they have consistently experienced problems treating waste streams from glass manufacturing companies with wastes that contain high concentrations of selenium. The commenter provided treatability testing data from a selenium waste stream, containing 80 mg/L TCLP, 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. The other data, from three different generators of selenium waste, suggest TCLP values of untreated waste of between 465–1064 ppm TCLP, with treated wastes achieving between 2.5 and 45.6 mg/L TCLP.

The Agency has reviewed all the treatment data and, for the most part, waste streams containing selenium exist either in relatively low concentrations (0.1–0.13 mg/L TCLP) or in extremely high concentrations (greater than 450 mg/L TCLP). Because of the highly divergent nature of these wastes and the difficulty in treating selenium with multiple metals at almost any concentration, it seems unreasonable to mandate that one treatment standard could be applicable to both. Calculations of a revised treatment standard, based only on the newly submitted treatment data for the high selenium concentration wastes, would yield a standard of 77.0 mg/L TCLP for selenium nonwastewaters. If a calculation is done after pooling all selenium data (including low concentration selenium data), a standard of 261 mg/L TCLP would result. The Agency is reluctant to establish a treatment standard for selenium nonwastewaters of either 77.0 mg/L or 261 mg/L TCLP on a national level. Earlier data suggest and commenters concur that for the majority of selenium wastes the proposed standard of 5.7 mg/L TCLP for selenium nonwastewaters is appropriate. Furthermore, only three high selenium concentration waste streams that could apparently not be treated to this level. Therefore, there is little reason to pool all treatment data or to engage in bifurcation of the selenium standard.

Accordingly, the Agency is promulgating a treatment standard of 5.7 mg/L TCLP for nonwastewaters containing selenium. The Agency, however, is convinced that the high-level selenium waste streams for which data were submitted to EPA will be unable to be treated to achieve the 5.7 mg/L TCLP standard. Therefore, in a **Federal Register** notice that will be published shortly, the Agency will be requesting comment on a proposal to grant a site-specific treatment variance for Waste Management, Inc. for the treatment of some D010 wastes containing high concentrations of selenium.

The Agency also is promulgating as proposed a wastewater treatment standard of 0.82 mg/L for D010 wastewaters. No comments were received on this issue.

(ii) Universal Treatment Standard (UTS) for Selenium. As noted above, in the May 12, l997 reproposal of the Phase IV rule, the Agency proposed to change the UTS for selenium nonwastewaters from 0.16 mg/L to 5.7 mg/L TCLP. For the reasons discussed above for D010 nonwastewaters, 5.7 mg/L TCLP is a better reflection of treatability of difficult-to-treat selenium waste streams than 0.16 mg/L TCLP. This is the level being promulgated today for the selenium nonwastewater UTS. (It should be noted that because the UTS is above the TC level for selenium, selenium is not considered an ''underlying hazardous constituent'' (UHC) in characteristic waste, according to the definition at 268.2(i)). The wastewater UTS for selenium remains unchanged at 0.82 mg/L.

k. Final Treatment Standards for Silver Wastes. (i) Treatment standards for TC Silver Wastes (D011). In today's final rule, EPA is promulgating a nonwastewater treatment standard of 0.14 mg/L TCLP for characteristic silver (D011). For wastewaters, EPA is promulgating a treatment standard of 0.43 mg/L as proposed in the original Phase IV proposal on August 22, 1995 (60 FR 43684). EPA is in the process of determining whether silver should remain on the TC list at 40 CFR 261.24(b) Table 1 or whether the current TC level should be altered. If EPA alters the status of silver on that TC list, EPA will revisit the treatment standards for silver.

(ii) Proposals, Comments, and Responses. Until today's notice, the treatment standards for wastewater and nonwastewater forms of D011 have both been 5.0 mg/L TCLP, which is the TC level. In 1995, EPA proposed a treatment standard of 0.43 for wastewaters and 0.30 mg/L for nonwastewater, based on the best treatment data in EPA's possession at that time (60 FR 43684). EPA received comments urging the Agency to refrain from setting a treatment standard lower than the TC level and instead suggesting that EPA remove silver from the TC list altogether due to new information on the low risk of silver to human health.

In a 1996 Notice of Data Availability (NODA), EPA presented the option of retaining the 5.0 mg/L treatment standard for D011 wastes (61 FR 21420, May 10, 1996). Comments were divided in two groups: those which supported the option, and those which stated that EPA had no firm basis for such a decision, given the potential toxicity of silver to aquatic life.

Since receipt of the comments on the NODA, EPA acquired more recent treatment data on TC metals, including silver. Based on these data, EPA learned that D011 nonwastewaters could be successfully treated to a level of 0.11 mg/L using HTMR, and EPA proposed revising the UTS for silver in its Phase IV Second Supplemental proposal. The grab data used to establish this treatment standard was submitted to the Agency by an HTMR facility (62 FR 26041) (Background Documents from Second Supplemental proposal). Commenters on the Second Supplemental reiterated that silver should not be on the TC list. However, the commenters continued, if silver remains on the list for now, EPA should not set a more stringent standard than the current one of 5.0 mg/L, but rather it should choose a risk-based standard. Commenters explained further that little D011 is disposed, because silver is generally recovered from silver wastes.

In response to the reproposal, the Agency received no significant comment on the technical aspects of achieving the proposed treatment standard; however the Agency did receive from International Metals Company (INMETCO) an additional 74 grab data points on the treatment of silver using HTMR. (See memorandum from Howard Finkel, ICF, Inc., to Nick Vizzone, USEPA Re: ''Calculation of Universal Treatment Standards (UTS) for HTMR Residues Using Data Submitted by Horsehead Research Development Company, Inc. and INMETCO,'' December 17, 1997.) The Agency used INMETCO data for the calculation of the proposed treatment standard and determined that this additional data should be included in the data pool. As previously discussed in Section III.A. of today's preamble, the Agency discovered an error in the calculation of the treatment standard. In applying the LDR methodology for calculating a treatment standard, the Agency failed to conduct a ''Z-score'' outlier test. With the application of this test and the inclusion of the 74 additional data points, 3 out of the 114 data points, were determined to be outliers, resulting in a revised treatment standard for silver nonwastewaters of 0.14 mg/L TCLP. The Agency has reviewed the comments in light of this amended standard and believes that it can be achieved by both HTMR and stabilization technologies. Data submitted by commenters in response to this proposal also support this conclusion. See supporting information contained in the docket for this rule.

The Agency does not have an adequate basis for taking the actions recommended by some commenters, i.e. to remove silver from the TC list, or regulate it at a less stringent level than the proposed technology-based treatment standard. EPA is in the process of determining whether silver should remain on the TC list at 40 CFR 261.24(b) Table 1, or whether the current TC level should be altered. In addition, EPA continues its work on the Hazardous Waste Identification Rule (HWIR) to establish risk-based exit levels for hazardous wastes. The Agency is not yet able to establish a nationally-applicable risk-based level for silver that fulfills the statutory charge of minimizing threats of hazardous waste to human health and the environment.

The process of establishing such a level is technically complex; EPA is currently modeling the ecological and human health effects of exposure to silver through numerous pathways. Several issues remain unresolved concerning human health and environmental risk. EPA is continuing to investigate these issues. The Agency recently acquired studies indicating that silver may be connected to central nervous system and other non-cancer effects in humans. The draft Reference Dose for these effects have not been finalized by the Agency for use in risk assessments. (A Reference Dose is a benchmark level for chronic toxicity that is protective of human health.) In addition to potential adverse human health effects, uncertainties and concerns also remain for potential adverse environmental effects. Although EPA removed the Maximum Contaminant Level (MCL) for silver in drinking water, the Ambient Water Quality Criteria remain in effect due to potential aquatic toxicity. Further areas of uncertainty are how silver speciates after release (i.e. which valence state of silver would be present). The issue could be important since potential toxic effects differ depending on the species of silver present. In short, EPA's work on understanding risks from disposal of silver-containing hazardous wastes is ongoing, and it would be premature to establish a treatment standard based on risk at this time.

In the absence of such ''minimize threat'' levels for hazardous constituents, the Agency establishes standards based on Best Demonstrated Available Technology (BDAT). (See full explanation in the preamble of the Phase II Final LDR rule at 59 FR 47986, September 19, 1994.) The fact that the UTS for nonwastewater forms of silver is being lowered (made more stringent) from the existing level of 0.30mg/L to 0.14 mg/L is due to new data on what treatment technology achieves. As explained in the summary of this preamble section (Section III: Revised Land Disposal Restrictions for Metal Constituents in All Hazardous Wastes, Including Toxic Characteristic Metals), technology-based standards are the best assurance that threat is minimized, given the uncertainty as to the level at which threats of hazardous waste disposal are minimized.

EPA expects that the new treatment standard for silver wastes will have little, if any impact on the regulated community. As stated by commenters, high-silver wastes are generally recycled due to their economic value and are covered by the special streamlined standards for recyclable materials utilized for precious metal recovery at 40 CFR Part 266.70 Subpart F. Moreover, the Regulatory Impact Analysis for this rule estimated that the new, more stringent UTS levels for metal constituents, including silver, will not increase compliance costs. This is because the current treatment methods already achieve the new standard of 0.14 mg/L in silver nonwastewaters. (Achievability of the UTS for TC silver wastewaters is not an issue; EPA received no comments nor data on its proposal to apply the existing UTS of 0.43 mg/L.)

Thus, the Agency is promulgating the wastewater standard of 0.43 mg/L as proposed and the nonwastewater standard of 0.14 mg/L. If EPA changes the status of silver on the TC list, EPA will revisit the treatment standards for silver wastes.

(iii) Universal Treatment Standard (UTS) for Silver Nonwastewaters. (Please refer to the discussion above about the development of the treatment standard for characteristic silver for information on the development of the UTS levels.) In today's final rule, EPA is promulgating a nonwastewater UTS of 0.14 mg/L TCLP for silver.

l. Final Universal Treatment Standard for Nonwastewater Forms of Thallium. The Agency proposed in the Second Supplemental Proposed Rule to change the UTS for thallium-containing nonwastewaters from 0.078 mg/L TCLP to 0.20 mg/L. (The original standard was based on composite sampling from an HTMR facility). This proposal was based on new data obtained by the Agency and presented in that notice. Several commenters supported the change. However, two commenters argued that EPA had not demonstrated that existing commercial technologies were capable of achieving the proposed standards or that technologies were otherwise available. The Agency remains unconvinced by the arguments of the commenters and notes that they supplied no treatment data in support of their contentions. Accordingly, the Agency is today promulgating as proposed a revised UTS for nonwastewaters containing thallium of 0.20 mg/L TCLP. No change was proposed for wastewater containing thallium; therefore the UTS remains 1.4 mg/L.

m. Final Treatment Standard for Nonwastewater Forms of Vanadium in P119 and P120 Wastes. The Agency proposed in the Second Supplemental Proposed rule to change the UTS for nonwastewaters containing vanadium in P119 and P120 wastes from 0.23 mg/L TCLP to 1.6 mg/L TCLP. This proposal was based on new data obtained by the Agency and presented in that notice. Commenters were supportive of the change. The treatment standard of 1.6 mg/L TCLP is being promulgated as proposed. No change was proposed for wastewater containing vanadium in P119 and P120 wastes, therefore, the UTS remains 4.3 mg/L. The Agency would like to point out that vanadium is not an ''underlying hazardous constituent'' in characteristic waste, according to the definition at 268.2(i).

n. Final Treatment Standard for Nonwastewater Forms of Zinc in K061 Waste. The Agency proposed in the Second Supplemental Proposed rule to change the treatment standard for zinc nonwastewaters in K061 waste from 5.3 mg/L to 4.3 mg/L . This proposal was based on new data obtained by the Agency and presented in that notice. One commenter was supportive of the change, while two other commenters were concerned with zinc being identified as an UHC. Still another commenter, a major HTMR facility, submitted data (152 data points) showing 100% compliance with the standard after 6 high statistical outliers were removed. Indeed, the great majority of these data showed zinc at levels an order of magnitude below the promulgated standards. EPA believes these data confirm the achievability of today's standard. Therefore, the Agency is today promulgating a revised nonwastewater treatment standard of 4.3 mg/L TCLP for K061 waste. No change was proposed for wastewater containing zinc in K061; therefore the UTS remains 2.61 mg/L. In response to the comments regarding zinc as an UHC, the Agency would like to point out that zinc is only regulated in K061 waste; it is not defined as an ''underlying hazardous constituent'' in characteristic waste, according to the definition at 268.(i).

UNIVERSAL TREATMENT STANDARDS FOR TWELVE METAL CONSTITUENTS

[Affecting Nonwastewater TC Metal Wastes and Nonwastewater Metal Constituents in All Wastes]

Waste code	Constituent	TC level (mg/L)	Existing UTS level (mg/L TCLP)	2nd supplemental proposed UTS level (mg/L TCLP)	Final UTS level (mg/L TCLP)
D005	Barium	100	7.6	21.0	21.0
D006	Cadmium	1.0	0.19	0.20	0.11
D007	Chromium	5.0	0.86	0.85	0.60
D008	Lead	5.0	0.37	0.75	0.75
D009- all others	Mercury	0.2	0.025	0.025	0.025
D010	Selenium	1.0	0.16	5.7	5.7
D011	Silver	5.0	0.30	0.11	0.14
	Antimony		2.1	*0.07	1.15
	Beryllium		0.014	*0.02	1.22
	Nickel		5.0	13.6	11.0
	Thallium		0.078	0.20	0.20
	Vanadium **		0.23	1.6	1.6
	Zinc **		5.3	4.3	4.3

* The proposed UTS levels for antimony and beryllium were rounded up to the nearest 0.01 mg/L TCLP.

** Vanadium and zinc are not underlying hazardous constituents.

Note: Treatment standards for TC metal wastewaters have also been revised in today's rule, but are not reflected in this table.

D. Use of TCLP to Evaluate Performance of Treatment Technology for Treating Hazardous Metal Constituents

Commenters did not question the appropriateness of using the TCLP as a means of evaluating the performance of the treatment technology used to treat metal hazardous constituents in hazardous wastes. EPA is addressing the issue *sua sponte* to set out why the recent opinion of the D.C. Circuit in *Columbia Falls Aluminum Co.* v. *EPA* (No. 96–1234, April 3, 1998) does not affect use of the TCLP for this purpose.

Columbia Falls presented an unusual set of facts. EPA had established treatment standards for spent aluminum liners (waste K088), which standards used the TCLP to measure performance of the treatment technology for several hazardous constituents, including arsenic and fluoride. All of the commercial treatment capacity for this waste was provided by a single facility, and all of the treatment residue from this single process was disposed at a single location. Slip op. at p. 6; 62 FR at 1993 (Jan. 14, 1997). Notwithstanding that the treatment process was able to achieve the treatment standards for arsenic and fluoride as measured by the TCLP (i.e., the treatment residue, when tested with the TCLP, never exceeded the regulatory levels), actual *leachate* from the disposal site contained significantly higher levels of these constituents. *Id.* EPA also had not offered any substantive explanation for continued use of the TCLP to measure performance of the treatment process for these constituents after the extreme disparities in actual performance in the field became known. *Id.* p. 18. Under these circumstances, the court held that it was arbitrary and capricious to continue to use the TCLP because it bore no rational relationship to what was actually occurring. *Id.* p. 19.

None of these circumstances are present here. The TCLP has not been shown here to be underpredictive of performance of treatment technology for key hazardous constituents for any wastes, much less, as in *Columbia Falls,* to be drastically underpredictive (for two constituents) for 100 % of the wastes to which the test applied. Moreover, the wastes affected by the standard in today's rule will not uniformly be going to a single disposal environment where actual leaching of key constituents is shown to be higher than the regulatory level. Rather, the wastes will be decharacterized and so can be disposed in any landfill: municipal, subtitle D or subtitle C. Given the enormous diversity of characteristic wastes and the diversity of likely disposal environments, the TCLP will not pervasively underpredict as was the case with spent potliners. Unlike the situation in *Columbia Falls,* therefore, there is no argument that application of the TCLP to measure treatment performance will fail to minimize threats posed by these wastes' land disposal.[1]

EPA also emphasizes that the LDR treatment standards are technology-based, not risk-based. A key role of the TCLP in the treatment standard is to measure whether the best demonstrated treatment technology has been properly applied to the waste. Thus, unlike the situation when the test is used as a means of identifying whether or not wastes are hazardous, the TCLP is not principally serving a predictive function when it is used as a component of an LDR treatment standard. The test is normally a good measure of evaluating the performance of treatment technology both because it is a widely-available test for metal mobility, and also because it is typically somewhat aggressive (*Edison Electric*, 2 F.3d at 445). Thus, it is a useful tool for measuring whether metal mobility has been substantially reduced in order that threats posed by land disposal be minimized (as required by section 3004 (m)). In the Agency's view, therefore, questions as to the validity of the TCLP as a component of LDR treatment standards are raised only under the extreme circumstances present in *Columbia Falls,* where, for all wastes and all disposal scenarios affected by the standard, large disparities between actual environmental field results and the treatment standard raise significant questions as to whether treatment is minimizing threats. These questions are not present for the metal-containing wastes here.

IV. Application of Land Disposal Restrictions to Characteristic Mineral Processing Wastes

Summary

EPA is today finalizing its proposal to apply the Universal Treatment Standards (UTS), as revised in part today, to the newly identified characteristic mineral processing wastes. In earlier rules and a Report to Congress, EPA has determined which mineral processing wastes are not excluded in the Bevill Amendment and are thus considered ''newly identified'' wastes subject to RCRA regulations. (See 54 FR 36592, September 1, 1989; 55 FR 2322, January 23, 1990; and Report to Congress on Special Wastes from Mineral Processing, USEPA, July 31, 1990.) The treatment standards being promulgated today are located in the table ''Treatment Standards for Hazardous Wastes'' at 268.40 in the regulatory language for today's rule. The wastes are identified by characteristic waste code (e.g. D002 corrosive waste, or D008 TC lead waste); there is no separate section in that table for characteristic mineral processing wastes.

A. Proposal, Comments, and Responses

In the original Phase IV, EPA proposed to apply the metal UTS, as measured by the TCLP (60 FR 43582, August 22, 1995) to all TC metal wastes. On January 25, 1996, EPA further proposed to apply the existing UTS to the newly identified mineral processing wastes, i.e., mineral processing wastes that exhibit a characteristic and do not have Bevill status and are not excluded from being a solid wastes due to recycling. The Agency stated in this proposal that existing data showed that these ''newly identified'' mineral processing wastes were similar to those wastes for which the UTS was achievable, and consequently the UTS fairly reflected the performance of Best Demonstrated Available Technology (BDAT) for these wastes. (See 61 FR 2338 for a complete discussion of the Agency's rationale for extending the UTS to both wastewater and nonwastewater forms of ''newly identified'' mineral processing wastes.)

Many commenters in response to this proposal took issue with the Agency's conclusions that the existing data demonstrated that the UTS was achievable for the newly identified mineral processing wastes and stated that the record for the rulemaking reflected no such showing. The commenters further argued that to develop representative treatment standards for mineral processing wastes, the Agency must: (1) Collect and analyze a representative mineral processing waste characterization and treatability data set; (2) analyze that data using well-reasoned and documented methods for determining the treatability of the subject wastes; (3) make a determination as to whether the UTS or some other LDR treatment standards are appropriately applied to mineral processing wastes; and (4) provide notice and an opportunity to comment on that determination prior to imposing any LDR treatment standards on such wastes. Several other commenters took issue with the Agency's use of only HTMR data to develop the treatment standards.

As a result of these comments and others received in response to the original Phase IV rule, the Agency decided to further assess the treatment of TC metal wastes and mineral processing wastes. As previously discussed in today's preamble, the Agency collected actual stabilization performance data during three site visits conducted in September 1997. In particular, treatment data were collected for the following primary mineral processing wastes: cadmium sponge residue, cupel and crucibles from fire assay laboratories, slag from fire assay laboratory, soil and debris contaminated with sulfuric acid, blast furnace slag, baghouse dust, lead/bromide residue, and gold ore leach tailings. In addition, treatment data from the following secondary mineral processing wastes

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[1] Nor is there a legitimate argument that the TCLP is impermissibly overpredictive. Indeed, since the TCLP has already been upheld as a means of identifying many of these metal-containing wastes as hazardous, *Edison Electric Inst.* v. *EPA*, 2 F.3d 438, 444–45 (D.C. Cir. 1993), and since the 'minimize threat' requirement in section 3004(m) is a more stringent test, *HWTC III*, 886 F.2d at 363, *a fortiorari* it is reasonable to use the TCLP as part of the process of assuring that threats posed by land disposal of these wastes are minimized.

were also collected: lead slag waste, lead-bearing assay laboratory wastes, lead contaminated wastes, cupels, and debris; blast furnace slag, lead recycling by-products, lead contaminated soils, and lead battery recycling slag waste. Many of these wastes were particularly difficult to treat due to high total and leachable levels of metals, extreme Ph, and presence of multiple hazardous metal constituents.

As previously discussed in an earlier section of today's preamble, the Agency assessed two data sets representing performance of stabilization and HTMR for the treatment of metal-containing waste streams. This assessment began with the calculation of treatment standards for each of the two data sets. Next, the Agency compared the treatment levels for stabilization versus HTMR. Based on this comparison, the Agency selected the highest level for each metal as the proposed UTS to allow for process variability and detection limit difficulties. As noted earlier, this approach is consistent with the legislative goal of providing substantial treatment through standards that are achievable by an array of well-performing available treatment technologies.

On May 12, 1997, the Agency issued a Second Supplemental Proposal (62 FR 26041). In it, EPA proposed to change the numerical limits for all nonwastewater wastes containing the following metal constituents: antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc. EPA also proposed these same UTS treatment standards for TC metal wastes identified as hazardous due to the concentration of barium, cadmium, chromium, lead, selenium, or silver. Based on the data collection efforts, the methodology used to develop these revised standards, and the preponderance of mineral processing treatment data used to calculate the standards, the Agency was convinced that the transferability of the universal treatment standards to mineral processing wastes was well supported.

In response to these revised treatment standards and their application to mineral processing wastes, the Agency received few comments. Several commenters supported the Agency's decision to apply the LDR treatment standards to mineral processing wastes. A limited few, however, continued to argue that EPA's application of the LDR program to mineral processing wastes was not supported by the record. The commenters' position is unsubstantiated, relying entirely upon assertions that the standards are not achievable. No data was submitted to support the commenters' position. Conversely, the data in hand (some of which reflect successful treatment of hard-to-treat mineral processing wastes) show that the treatment standards are achievable using either stabilization or HTMR for mineral processing wastes. As a result, the Agency is today finalizing the applicability of the existing UTS to the newly identified mineral processing wastes.

The reader is referred to an earlier section of today's preamble for a complete discussion of treatment standards for metal wastes being promulgated today.

B. Clarification That Universal Treatment Standards Apply to Ignitable, Corrosive, and Reactive Characteristic Mineral Processing Wastes

As discussed above, the treatment standards promulgated in this rule will apply to all the newly identified characteristic wastes from mineral processing operations. This includes not only the mineral processing wastes exhibiting the toxicity characteristic (TC), but also wastes that exhibit the characteristic of ignitability (D001); corrosivity (D002); or reactivity (D003). (See definitions of these characteristics at 40 CFR 261.20 through 261.23.) The treatment standards found in 40 CFR 268.40 require removal of the characteristic as well as meeting the treatment standards for all underlying hazardous constituents (UHCs) reasonably expected to be present at levels above the UTS. The Agency received no comment on this issue at proposal (see 61 FR 2338, January 25, 1996). Therefore, the Agency has no reason to believe that the UTS are not achievable for mineral processing wastes also exhibiting the characteristic of ignitability, corrosivity and/or reactivity. As such, the Agency is today promulgating the application of UTS to D001, D002, and D003 mineral processing wastes.

C. Use of TCLP to Evaluate Performance of Treatment Technology for Treating Hazardous Metal Constituents in Mineral Processing Wastes

Part of this rulemaking involves consideration of what the appropriate regulatory test is to determine if mineral processing wastes exhibit the toxicity characteristic. The Agency addresses this issue in detail later in this preamble when discussing retention of the TCLP for this purpose. Here, we confirm that the Agency will also continue to use the TCLP as part of the LDR treatment standard for these wastes. Although commenters did not raise this issue, the Agency feels that addressing it is appropriate in light of the D.C. Circuit's recent decision in *Columbia Falls Aluminum Co.* v. *EPA* (No. 96–1234, April 3, 1998).

The critical component in making waste identification determinations (i.e., to determine whether a waste should be regulated) is ascertaining a plausible mismanagement scenario for the waste if unregulated, and finding a predictive model that can reasonably evaluate whether the waste is capable of posing substantial present or potential harm to human health and the environment under those conditions. *Edison Electric Inst.,* 2 F. 3d at 444. This issue simply does not arise in the LDR context since the wastes subject to LDR are regulated hazardous wastes, and the issue of where and how they would have been managed absent Subtitle C regulation is irrelevant.

In the LDR context, all land disposal (except that occurring in no-migration units) is defined as being unprotective (see, e.g. RCRA section 3004(d)(1)), largely due to the ''long-term uncertainties associated with land disposal'' (*id.*). For this reason, treatment standards reflecting performance of Best Demonstrated Available Technology provide an objective means of removing as much of this inherent ''long-term uncertainty'' as possible, and so permissibly achieve the ultimate requirement of minimizing threats posed by land disposal of hazardous wastes. *HWTC III,* 886 F. 2d at 362–65; 55 FR at 6642 (Feb. 26, 1990). The principal role of the TCLP in these treatment standards is assuring the performance levels achievable from use of these best treatment technologies, not predicting environmental fate in the disposal environment.

As discussed earlier, the TCLP is historically accepted as being well-suited for evaluating performance of treatment technology for metals given its availability and general aggressiveness for mobilizing metals. Also, we note that since the TCLP serves a different purpose in the LDR treatment standards than it serves for identifying wastes as hazardous, and since it is well-suited for that purpose, there would be no contradiction in using it as part of the LDR standard even if a different test were to be used (presumably in the future) for waste identification.

Nor does the *Columbia Falls* opinion undercut use of the TCLP as a component of treatment standards for mineral processing wastes. As noted earlier with respect to other toxic metal-containing wastes, EPA does not view *Columbia Falls* as requiring a change in use of the TCLP as part of the LDR treatment standards. The TCLP has not been shown generally to be underpredictive of performance of treatment technology for key hazardous constituents for any wastes, much less, as in *Columbia Falls,* to be drastically underpredictive (for two constituents) for 100% of the wastes to which the test applied. For all mineral processing wastes to which it was applied, the TCLP test has not been shown to be underpredictive either, and so would be part of the mechanism for assuring that treatment minimizes threats posed by land disposal of these wastes. Moreover, it should be noted that mineral processing wastes can be and are treated commercially, and the treatment residues are then disposed along with other wastes in different types of disposal units. See, e.g. the document entitled, ''Background Documents Supporting the Phase IV Final Rule: Metal Treatment Standards'' in the RCRA Docket (commercial treatment company treating mineral processing wastes along with other metal-containing wastes and disposing of commingled treatment residues). These units certainly can generate mildly acidic leachate. 51 FR at 40594 (Nov. 7, 1986). Given these circumstances, the TCLP is an appropriate part of a standard which minimizes threats posed by land disposal of these wastes.

V. Other LDR Issues That May Affect Both Toxic Characteristic Metal Wastes and Characteristic Mineral Processing Wastes

A. Treatment Standards for Soil Contaminated With TC Metal Wastes or Characteristic Mineral Processing Wastes

1. Summary

EPA has decided that the LDR treatment standards (i.e., UTS) for toxicity characteristic metals (D004–D011) and newly identified mineral processing wastes being promulgated in today's rulemaking will not apply to soils contaminated with these hazardous wastes. Instead, these contaminated soils will be subject to the treatment standards for soil originally proposed in a separate rulemaking entitled the Hazardous Waste Identification Rule for Contaminated Media (''HWIR-Media'') (61 FR 11804, April 29, 1996). These treatment standards are being finalized in a separate section of today's rule. However, because of their impacts on TC metal and mineral processing wastes, a brief introductory discussion is warranted at this point.

2. Discussion of Today's Approach

In the Phase IV proposed rule (60 FR 43682, August 22, 1995), the Agency did not specifically exempt soil contaminated with TC metal wastes from the newly proposed LDR standards; thus, the UTS standards for metals would have applied to TC metal soils. In the Phase IV First Supplemental Proposal (61 FR 2338, January 25, 1996), the Agency proposed applying existing universal treatment standards to newly identified mineral processing wastes, i.e., to mineral processing wastes that exhibit a characteristic, do not have Bevill status, and are not excluded from being solid wastes due to recycling. As a consequence, soils contaminated with these newly identified mineral processing wastes would also have been subject to UTS.

In today's rule, the Agency is finalizing alternative treatment standards for contaminated soil reproposed in the HWIR-Media rulemaking. (See the section of this preamble on treatment standards for contaminated soil.) These treatment standards for hazardous contaminated soils are being finalized for all hazardous wastes, including TC metal and newly identified mineral processing wastes.

B. LDR Treatment Standards for Manufactured Gas Plant Waste (MGP)

1. Summary

Today, the Agency is promulgating treatment standards for hazardous MGP wastes and soils, i.e., wastes and contaminated soils that resulted from processing coal to produce gas and that exhibit a characteristic of hazardous waste. Typically these operations were conducted at manufactured gas plants until the 1950s, and wastes remain at those closed MGP sites. MGP wastes are among the mineral processing wastes which the Agency determined in 1989 and 1990 to be subject to RCRA jurisdiction because they are not excluded from RCRA by the Bevill Amendment. See 54 FR 36592 (September 1, 1989). Hence, they are a subset of the newly identified mineral processing wastes covered by the prohibitions and treatment standards promulgated in this rule.

On January 25, 1996, EPA proposed to apply LDR treatment standards to MGP wastes (61 FR 2360). MGP wastes are no longer being produced, since manufactured gas plants are no longer in operation. The Agency notes that the LDRs only apply at closed MGP sites that are excavated and managed in a way that constitutes placement in a land disposal unit (See 61 FR 18805, April 29, 1996.) The LDRs would require that actively managed MGP wastes be treated to eliminate any characteristics and to achieve the UTS for any underlying hazardous constituents prior to land disposal. Today's rule finalizes the UTS for MGP wastes that exhibit the toxicity characteristic. However, for soils contaminated with MGP wastes, EPA is today promulgating treatment standards specifically for hazardous soil. These soil standards, generally, require treatment to achieve 90 percent reduction of hazardous constituent levels, or 10 times the UTS levels. See Section VII of this preamble.

Today's rule does not alter the Agency's 1993 memorandum that interpreted existing rules to say that the ash that results from burning MGP remediation wastes along with coal in utility boilers remains covered by the Bevill amendment and hence is not regulated under Subtitle C rules. (See memorandum, dated April 26, 1993, entitled ''Remediation of Historic Manufactured Gas Plant Sites'', from Sylvia K. Lowrance, Director of the Office of Solid Waste, to EPA Regional Waste Management Division Directors. The memorandum is located in the RCRA docket for the Phase IV Supplemental Proposal dated January 25, 1996; 61 FR 2338.) Such residuals are considered to be covered by the Bevill amendment because they result primarily from the combustion of coal (assuming, if the MGP remediation wastes that are co-burned are hazardous, the residues are not significantly affected by burning the MGP wastes, within the meaning of 40 CFR section 266.112).

2. Background

Manufactured gas plants were designed to generate gas from coal. The coal tar residuals generated from the process remain at these historic MGP sites. Many of these sites have soils contaminated with these coal tar residuals. The majority of these contaminated soils will come from the cleanup of historic MGP sites. A significant portion of the soil is nonhazardous, but approximately 15 percent of the soils fail the toxicity characteristic leaching procedure test for benzene. These toxicity characteristic (TC) soils also typically contain PAHs, heavy metals, inorganics, volatile aromatics, and phenolics. At certain closed MGP sites, there can be non-soil hazardous wastes, e.g., coal tars in tar holders, which may need to be treated to UTS levels if they are actively managed and land disposed.

3. Public Comments and EPA Responses

Commenters expressed several major concerns about the Phase IV proposal to apply UTS to MGP wastes. First, they urged the Agency to delay implementing the soil standards until the final HWIR-media rule becomes effective. In addition, commenters requested that EPA re-affirm the Agency's 1993 co-burning memorandum for MGP wastes. Finally, commenters urged the Agency to establish specified treatment methods for those MGP wastes that will not be managed according to the Agency's 1993 co-burning memorandum, rather than making the wastes subject to the UTS concentration levels as proposed. One commenter identified several methods of management that could be specified: ''recycling technologies including the use of coal tar residuals to manufacture asphalt, bricks, and cement; and combustion technologies that include utility boiler co-burning, incineration and thermal desorption.'' The commenter stated that specified methods would preserve flexibility for managing MGP site remediations and remove regulatory barriers to expeditious site cleanups.

Regarding the commenter's concern about the coordination of Phase IV standards and the HWIR-media rule, the Agency is finalizing treatment standards for hazardous contaminated soils in a separate section of today's rule. Also, although the Agency did not reopen the issue, the Agency confirms that the 1993 co-burning interpretation remains in effect.

The Agency has studied carefully the comment urging the Agency to specify incorporation of MGP waste into asphalt, bricks, or concrete as a designated method of treatment, which would have the effect of making wastes so treated not subject to meeting numerical treatment standards for hazardous constituents. The recycling of hazardous waste-contaminated soil in asphalt, brick, or cement manufacturing produces products that potentially could be applied or placed on the land. These recycling practices incorporate the contaminated soils into the products, and, thus, are considered to be a ''use constituting disposal'' (see section 261.2 (c) (1)). The use constituting disposal practice (assuming legitimate recycling is occurring) is regulated per the provisions of 40 CFR sections 266.20 through 266.23. This issue is discussed in more detail in section VII of the preamble.

At this time, the Agency does not have adequate information on asphalt, brick, or cement produced from MGP hazardous waste to determine whether these waste-derived products minimize threats posed by land disposal of MGP wastes. (See also response to USWAG comment #00035 in ''Phase IV Response to Comments'' in the docket to this rule.) Until the Agency can further study the issue, it is not designating production of these materials from MGP soils as a specified method of treatment. Existing 266.23 (a) continues to apply. And, as noted earlier, for MGP sites in particular, the Bevill exclusion still applies for MGP wastes co-burned in coal-fired utility boilers.

EPA is aware that the regulated community has requested various types of flexibility from LDR treatment standards in managing their site-specific cleanup, remediation, and/or removal activities of these wastes and contaminated soils. With the possible exception of use consituting disposal scenarios, the Agency continues to believe that more complete relief for remediation wastes is needed, particularly with respect to the land disposal restrictions and is best provided by targeted statutory change. Thus, the Agency will continue to participate in discussion of potential legislative solutions on this important issue.

Please refer to the Phase IV response to comments document that is available at the RCRA docket for responses to other issues raised by commenters.

C. Treatment Standards for Debris Contaminated With Phase IV wastes

The Agency is clarifying that debris contaminated with TC metal or characteristic mineral processing wastes can be disposed if it meets the treatment standards established in this rule, but also can be disposed if it meets the standards for debris set out at 40 CFR 268.45.

D. Treatment Standards for Radioactive Mixed Waste

1. Background

Radioactive mixed wastes are wastes which satisfy the definition of radioactive waste subject to the Atomic Energy Act (AEA) 10 CFR Part 61 and also contain waste that is either listed as a hazardous waste in Subpart D of 40 CFR Part 261, or that exhibits any of the hazardous characteristics identified in Subpart C of 40 CFR Part 261. Since the hazardous portions of the mixed waste are subject to RCRA, the land disposal restrictions apply to the mixed waste. Today's rule promulgates revised treatment standards for radioactive wastes that are mixed with metal characteristic wastes and do not currently have a method of treatment (i.e. HLVIT) specified as BDAT.

Treatment standards for radioactive waste mixed with metal-bearing waste were first promulgated in the Third Third rule at 55 FR 22626 (June 1, 1990). That rule established a subcategory of mixed wastes for a specific high level wastestream at the Savannah River site, for which a specified method of treatment is currently required. This method is HLVIT (vitrification of high-level radioactive waste) for radioactive high-level wastes generated during the reprocessing of fuel rods mixed with characteristic metal wastes. This was done because of the human health hazards associated with sampling that would be required if numerical standards were applied. The Third Third rule stated that all the promulgated treatment standards in that rule for RCRA listed and characteristic wastes apply to the RCRA hazardous portion of mixed radioactive (high-level, TRU, and low-level) wastes, unless EPA has specifically established a separate treatability group for a specific category of mixed waste. Thus, that rule required that radioactive waste mixed with metal characteristic waste would have to comply with the LDR treatment standard for the metal characteristic waste, as well as any requirements set forth by the NRC for the radioactive component of the mixed waste.

Because today's rule revises the treatment standards for metal characteristic wastes (i.e., revising certain metal numeric treatment standards, and applying UTS levels to underlying hazardous constituents in the characteristic waste), the treatment standards for radioactive waste mixed with metal characteristic waste that were not specifically subcategorized in the Third Third rule are also affected. Today's rule also revises treatment standards for twelve metal constituents in all wastes, including radioactive mixed wastes. In conclusion, unless specifically noted in Section 268, the treatment standards promulgated today apply to all mixed wastes.

2. Proposal and Issues Discussed by Comments

In addition to revising metal characteristic treatment standards that apply to mixed waste, the Phase IV proposal also discussed mixed radioactive and characteristic metal wastes which have been previously stabilized to meet the LDR requirements, and are now being stored until disposal capacity becomes available. The rule proposed to allow this particular category of stabilized characteristic metal mixed wastes to comply with the LDR metal standards that were in effect at the time the waste was stabilized. More simply, they would require no further treatment to comply with the newly promulgated TC metal standards. The proposal stated that mixed radioactive/characteristic metal wastes that are stabilized after the effective date of Phase IV would be subject to the metal treatment standards promulgated in the Phase IV rulemaking.

The majority of commenters agreed with this approach. The Agency believes that requiring facilities to re-treat the wastes could pose significant threats to human health and the environment (worker exposure, environmental releases). Essentially, requiring these wastes to meet the newly promulgated treatment standards could necessitate treaters opening sealed drums of stabilized mixed waste, grinding the stabilized material, and re-treating to comply with the treatment standards for the few constituents for which EPA is lowering the standards. One commenter wanted the exemption to be broadened to include wastes that were treated by methods other than stabilization. Because the exposure concerns of re-treating the previously stabilized waste primarily center around the idea of first grinding up the stabilized material to retreat it and the potential added radiological exposures attendant thereto, the broadening of this exemption without more specific information is not warranted at this point. Of course, if any wastes already meet the applicable treatment standards, for example macroencapsulation, then there is no need to initiate further treatment. It is important to emphasize that the Agency does not want any more handling of this material than is necessary, and we will entertain site-specific treatment variances to ensure that the appropriate balance is struck to ensure minimization of threats.

As noted, the majority of commenters agreed that hazards from added worker radiation exposure associated with re-treatment (i.e., opening drums, grinding already treated masses of mixed waste) would probably offset any gain in protection of human health and the environment resulting from compliance with the new metal treatment standards proposed in Phase IV. It was pointed out by one commenter that this is consistent with the Storage Prohibition (40 CFR 268.50(e)), where wastes that have met the applicable treatment standards are excluded from the storage prohibition. In addition, one commenter stated that these wastes have been treated to meet the LDR standards in place at the time of treatment, and the only reason they have not already been land disposed is that capacity has not been available. The one commenter who disagreed with the proposal stated that neither retreatment nor an exemption from the new standards are reasonable options, but prefers retreatment. The commenter did not provide support, and the Agency is not persuaded that retreatment is environmentally preferable. Thus, the Agency is promulgating the exemption as proposed. In response to comments, EPA is also indicating that the same principle applies with regard to listed wastes stabilized to meet a previous treatment standard, which standard is affected by this rule because the metal UTS have changed. Again, retreating these wastes would likely create new threats, not minimize them.

One DOE facility requested that the Agency clarify whether a waste required to be treated by a specific technology (i.e., HLVIT) would be required to be further treated for any UHCs present in the waste above UTS levels. The Agency is not imposing additional treatment requirements on those wastes for which a method of treatment (HLVIT) is specified.

Four facilities are concerned that uranium mills tailings will not remain exempt under RCRA. These wastes are by-product materials from uranium mining (i.e., waste acids from solvent extractions, barren lixiviants, slimes from solvent extraction and waste solvents generated in the beneficiation process during the extraction of uranium ore) and, therefore, are excluded from the treatment standards being promulgated today for TC metal wastes. With respect to the radioactive mineral processing wastes, RCRA Section 1004 (27) as codified in 40 CFR 261.4(a)(4) states that ''...source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954 as amended, 42 U.S.C. 2100 *et seq*...'' are not solid wastes. Therefore, such excluded materials are not subject to this rule. However, all other wastes not excluded under 40 CFR 261.4 are subject to today's rulemaking (assuming the waste is otherwise subject to today's rule).

Therefore, the Agency is today finalizing as proposed numerical treatment standards for radioactive waste mixed with metal-bearing characteristic waste for which no method of treatment has been established as the treatment standard.

E. Underlying Hazardous Constituents in TC Metal Wastes and Characteristic Mineral Processing Wastes

Summary: As with other characteristic wastes, TC metal wastes (D004—D011) and newly identified mineral processing wastes cannot be land disposed until the characteristic is removed and any underlying hazardous constituents (UHCs) are below universal treatment standards.

1. Background

In 1993, EPA began requiring that, in addition to removing the characteristic in the characteristic wastes, treatment must ensure that UHCs are below their UTS levels. (58 FR 29860; see also 59 FR 47982. See also *Chemical Waste Management* v. *EPA*, 976 F. 2d at 13–14, 16–18 (treatment standards may be lower than the level at which waste is identified as hazardous, and underlying hazardous constituents must be treated to minimize threats posed by land disposal)). UHCs are any constituents in 40 CFR 268.48 that are reasonably expected to be present at levels above the UTS at the point of generation of the characteristic waste. See 40 CFR 268.2(i). EPA's review of the treatment data on TC metal and mineral processing wastes shows that these wastes often contain underlying hazardous constituents, and that UTS are achievable for the UHCs.

2. Discussion of Today's Approach

In the August 22, 1995 Phase IV proposed rule, EPA proposed to apply treatment standards to all TC metal wastes, and on January 25, 1996, EPA further proposed the same for characteristic mineral processing wastes. See 60 FR 43654 and 61 FR 2338. Furthermore, EPA proposed that when the new treatment standards were promulgated, all of those newly identified wastes would have to be treated not only to meet the proposed treatment standards, but also to meet treatment standards for any UHCs reasonably expected to be present (at levels above UTS) in those wastes at the wastes' point of generation. See 60 FR 43654.

One commenter disagreed with the Agency's proposal, stating that the TC metal wastes that also contain organic UHCs would have to be treated by combustion technologies to achieve the organic UTS levels. The Agency disagrees. The organic UTS levels were based on the performance of combustion as well as other removal and destruction technologies. These other removal and destruction technologies can be used to treat organic UHCs to UTS levels in TC metal wastes. Thus, pretreatment of the waste can be used to achieve the organic UTS levels. In addition, the commenter believed there would be difficulties in stabilizing incinerator ash to meet the finalized UTS levels for the metals. The Agency does not agree. In determining the UTS numbers for each metal, the wastes with the most difficult to treat metal constituents were treated by HTMR and stabilization technologies. The higher value between the two technologies was selected as the treatment standard. Thus, treatment using either HTMR or stabilization is expected to achieve the final metal UTS levels. It should be noted that selenium is not being regarded as a UHC since its treatment standard is above its characteristic level. Thus, a selenium characteristic waste will always be hazardous unless the selenium concentration is below the characteristic level of 1 mg/L TCLP. Fluoride, vanadium, and zinc are other metals not considered UHCs in characteristic wastes because these three metals are not on the Hazardous Constituents Table, 40 CFR 261 Appendix VIII (i.e., they are not ''hazardous constituents''). (See Background Document for Phase IV Second Supplemental Proposed Rule.)

VI. Issues Relating to Newly-Identified Mineral Processing Wastes

As explained above, EPA considers mineral processing hazardous wastes to be newly identified or listed for purposes of determining when LDR prohibitions apply, since their status as hazardous wastes was not established until after 1984. Today's rule establishes prohibitions and treatment standards for these wastes, pursuant to RCRA section 3004(g)(4).

However, there are a series of important threshold issues in determining what these prohibitions and treatment standards apply to, generally involving the issues of whether primary mineral processing secondary materials are solid and hazardous wastes. There are three main issues. A fundamental first issue is whether, if a mineral processing secondary material (which would otherwise be a hazardous waste) is recycled within the mineral processing industry sector, it is a solid waste. Of particular importance in assessing applicability of the LDR program, is a second issue: whether there is land placement of the mineral processing secondary material before recycling, or during the recycling process. If the material is a waste, a third issue is relevant: is the waste a beneficiation/extraction waste or one of 20 mineral processing wastes that are excluded from subtitle C regulation under the Bevill exclusion (see RCRA 3001 (b)(3)(A)(ii)).

In this rulemaking, EPA also is addressing certain sub-issues that are related to determining whether a particular mining waste is subject to the Bevill exclusion, including whether a waste is ''uniquely associated'' with mining, how the introduction of non-exempt, mineral processing feedstocks into a Bevill process may affect the Bevill status of the waste generated from the process, and how the mixture of Bevill wastes with other hazardous wastes affects the Bevill status of the resulting wastes when disposed.

As stated in the January 1996 proposal, EPA is not reopening in any respect the Bevill determinations previously made by the Agency, including the Agency's articulation in 1989 of the functional distinctions between beneficiation and mineral processing. *See* 61 Fed. Reg. 2354. Some commenters misinterpreted EPA's statements in the proposal generally describing the beneficiation/processing distinction as somehow reinterpreting the scope of the Bevill amendment. That discussion was intended, however, merely to restate principles articulated by EPA in 1989 (see 54 Fed. Reg. 36619), not to reopen in any way the distinctions as articulated previously by the Agency. Whether a particular waste is from beneficiation or mineral processing will continue to be determined based on 40 CFR 261.4(b)(7) and criteria articulated by EPA in the 1989 preamble.

The following sections of the preamble discuss these threshold issues.

A. Introduction

In July of 1988, the U.S. Court of Appeals, for the D.C. Circuit in *Environmental Defense Fund* v. *EPA (EDF II)*, 852 F.2d 1316 (D.C. Cir. 1988), *cert. denied*, 489 U.S. 1011(1989), ordered EPA to restrict the scope of the Bevill mining waste exclusion, as it applied to mineral processing wastes, to include only ''large volume, low hazard'' wastes. In response, the Agency promulgated several rules that delineated the scope of the Bevill exemption for extraction/beneficiation and mineral processing wastes. In these rulemakings, the Agency applied high-volume/low toxicity criteria for determining whether a particular waste was subject to the Bevill exemption. The Agency also described the general characteristics that would distinguish extraction/beneficiation wastes from mineral processing wastes. The rules also evaluated which specific mineral processing wastes were in conformance with these high volume/low toxicity criteria and thus were eligible for the exclusion provided by RCRA 3001(b)(3)(A)(ii) (the ''Bevill exclusion'').

These rules were promulgated on September 1, 1989 (54 FR 36592) and on January 23, 1990 (55 FR 2322). EPA was required to prepare a *Report to Congress* which further studied mineral processing wastes identified in the 1990 rule to determine their regulatory status under the Bevill exclusion. This report was issued on July 31, 1990 (*Report to Congress on Wastes from Mineral Processing*). EPA fully considered information from, and comments on, the *Report to Congress* in a regulatory determination published on June 13, 1991(56 FR 27300). The list of Bevill exempt activities and wastes is set out at 40 CFR 261.4(b)(7).

Many mineral processing wastes that EPA determined did not fall within the Bevill exclusion as a result of the 1991 rule appear to exhibit the toxicity characteristic due to metal content (D004–D011), and also exhibit corrosivity (D002), and/or reactivity (D003). For purposes of LDR applicability, these wastes are ''newly identified'' because they were brought into the RCRA Subtitle C system after the date of enactment of the Hazardous and Solid Waste Act Amendments on November 8, 1984. (See 55 FR at 22667 (June 1, 1990). Hence, their land disposal has not been prohibited until today's rule.

The Agency is currently required by a court approved consent decree (*EDF* v. *Browner*, No. 89–0598 (D.D.C.)) to promulgate LDR restrictions for characteristic and listed mineral processing wastes, and metal wastes hazardous under the revised toxicity characteristic, by April 15, 1998. On April 14, 1998, EPA filed an unopposed motion requesting the Court to extend the deadline to April 30, 1998 to establish Land Disposal Restrictions for newly identified mineral processing wastes by April, 1998. The legal obligation to establish prohibitions on land disposal and treatment standards for newly identified mineral processing wastes is established by statute. RCRA section 3004(g)(4).

B. Overview of Today's Rule

1. Issues Related to Which Mineral Processing Secondary Materials are Subject to LDRs

As noted above, a threshold question when considering whether wastes are prohibited from land disposal is whether the mineral processing secondary materials are ''solid wastes'' under RCRA. The issue is of importance with respect to land disposal prohibitions for the mineral processing industry because this industry recycles mineral processing secondary materials that exhibit hazardous waste characteristics, and sometimes uses land-based units—piles and impoundments—to store these materials before recycling. Thus, there is an issue as to whether such materials are solid wastes subject to the land disposal prohibition (as well as to the rest of Subtitle C). The Agency issued two proposals (61 FR 2338, January 25, 1996, and 62 FR 26041, May 12, 1997) which discussed potential RCRA jurisdiction over secondary materials from mineral processing that are reclaimed within the industry sector and sought comment on a proposed conditional exclusion from the definition of solid waste.

We now further summarize how today's rule deals with issues raised by whether and when mineral processing secondary materials, when placed in land-based storage units, are subject to the LDR standards and other Subtitle C controls. The rationale for the Agency's decisions are described below.

To be a hazardous waste, a material must first be a solid waste. RCRA section 1004 (5). To be a ''solid waste'' a material must in some sense be ''discarded.'' RCRA section 1004 (27). A material is not ''discarded'' if it is ''destined for immediate reuse in another phase of the industry's ongoing production process and [has] not yet become part of the waste disposal problem.'' *American Mining Congress* v. *EPA*, 907 F. 2d 1179, 1186 (D.C. Cir. 1990).

This rule amends the current RCRA rules (existing 40 CFR 261.2(c)(3)) defining which ''secondary materials''—sludges, by-products and spent materials—being generated by and reclaimed by mineral processing or beneficiation facilities are solid wastes. The rule does so by creating a conditional exclusion to the regulatory definition of solid waste, so that:

(a) Mineral processing secondary materials may not be stored on the land before they are reclaimed. The rule provides a partial exception to this principle: if the pile is placed on a pad which has been approved as protective by an EPA Region or a State with an authorized program, the pile would not be considered to be storing solid or hazardous waste, and so would be outside RCRA jurisdiction. Thus, if storage is used prior to reentry into a mineral processing reclamation process, to be excluded, all mineral processing secondary materials must be placed in tanks, containers, buildings, or approved piles resting on pads;

(b) Mineral processing secondary materials must be legitimately recycled to recover metal, acid, cyanide, water, or other values:

(c) Mineral processing secondary materials cannot be accumulated speculatively; and

(d) Facilities utilizing this conditional exclusion must submit a one-time notification of their recycling activities to EPA or the authorized State describing: the materials being recycled and the processes into which they are recycled; where storage units are located and their design. Facilities must update the notification if their recycling activities change.

EPA is thus essentially disclaiming authority over mineral processing secondary materials that are reclaimed within the mineral processing or mining/beneficiation industry sector, so long as there is no land-based storage preceding reclamation. Further, potential jurisdiction affects only *storage*. EPA is not asserting authority over any mineral processing production unit, even if the unit is land-based.

2. Issues Related to Whether Materials are Within the Scope of the Bevill Exclusion

a. Use of Non-Bevill Materials as Feedstocks to Operations Whose Waste is Bevill Exempt. Today's rule also allows secondary materials from mineral processing to be co-processed with normal raw materials in beneficiation operations which generate Bevill exempt wastes, without changing the exempt status of the resulting Bevill waste, provided that legitimate recovery of the mineral processing secondary material is occurring, and provided that primary ores and minerals account for at least 50 percent of the feedstock. The Agency voiced concern at proposal that the addition of mineral processing secondary materials into a Bevill exempt extraction/beneficiation process could have the potential to increase the risk of the resulting wastes. The Agency proposed adding a condition—the use of a significantly affected test (similar to the existing test used in the Burning in Industrial Furnaces (BIF) Rule (see 40 CFR 266.112))—as a means of assuring that resultant Bevill wastes were not adversely impacted by co-processing. EPA also considered simply limiting eligibility for Bevill status to situations where Bevill raw materials comprised the sole feedstock to the process.

After considering public comments, the Agency has decided to adopt the general approach proposed in January 1996, with one change. The Agency now does not believe that the use of the ''significantly affected'' test would appreciably reduce risks posed by the resulting wastes, and the Agency is concerned that it would severely disrupt legitimate recycling practices within beneficiation and mineral processing industries. Even in situations where a constituent may increase due to recycling, the increase may not be environmentally significant, may be balanced by the lowering of other constituents, or may be off-set by having to dispose of the material and utilize additional raw material feedstocks.

b. Uniquely Associated. The Bevill exclusion for the primary metal sector is limited to extraction/beneficiation wastes and 20 mineral processing wastes. Under Section 3001(b)(3)(A)(ii) of RCRA, the Bevill exclusion is available for ''solid waste from the extraction, beneficiation and processing of ores and minerals.'' Under the Agency's longstanding interpretation, a waste must be ''uniquely associated'' with mining and processing of ores and minerals to be subject to the Bevill exclusion. The Agency currently uses a qualitative approach (see 45 FR 76619 and 54 FR 36623) to determine if a waste is uniquely associated. Because of public interest in how the Agency makes these determinations, the Agency sought comment on alternative approaches for making ''uniquely associated'' determinations.

The Agency is retaining and clarifying in this rule its use of its qualitative approach. The Agency recognizes that determining whether a particular waste is uniquely associated with extraction, beneficiation, and processing involves an evaluation of the specific facts of each case. While the Agency discussed, in the May 1997 proposal, several options that would establish a bright line for making this determination, the Agency is concerned that any of these tests could potentially be either over- or under-inclusive of the wastes that, in EPA's view, are best viewed as uniquely associated.

In the Agency's view the following qualitative criteria should be used to make such determinations on a case-by-case basis:

(1) Any waste from ancillary operations are not ''uniquely associated'' because they are not properly viewed as being ''from'' mining or mineral processing.

(2) In evaluating wastes from non-ancillary operations, one must consider the extent to which the waste originates or derives from processes that serve to remove mineral values from the ground, concentrate or otherwise enhance their characteristics to remove impurities,

and the extent to which the mineral recovery process imparts its chemical characteristics to the waste.

c. Bevill Mixtures. EPA first addressed mixing of hazardous wastes with Bevill wastes in 1989 (see 54 FR 36622–23). That rule provided that mixtures of Bevill wastes and listed wastes would be considered a hazardous waste unless and until the mixture was delisted. A mixture of Bevill waste and non-excluded characteristic hazardous waste, however, would be considered hazardous if it exhibited a characteristic of the non-excluded waste, but not if it exhibited a characteristic imparted to it by the Bevill waste. As explained in the proposal, this Bevill mixture rule was remanded to the Agency in *Solite Corp* v. *EPA,* 952 F.2d 472, 493–94 (D.C. Cir. 1991), and an emergency reinstatement of that rule was vacated on procedural grounds in *Mobil Oil* v. *EPA,* 35 F.3d 579 (D.C. Cir. 1994). Today EPA is reinstating the 1989 Bevill mixture rule. Under this 1989 rule, a mixture of a Bevill-exempt waste and a characteristic hazardous waste (or a waste listed solely because it exhibits a hazardous characteristic) is a hazardous waste if it continues to exhibit the characteristic of the non-excluded waste. Mixtures of Bevill wastes and other listed wastes are hazardous wastes unless and until delisted. In addition, the act of mixing Bevill and and non-Bevill wastes is subject to all normal Subtitle C consequences (i.e., requires a permit if it constitutes treatment, storage of disposal of hazardous wastes). EPA is adopting this approach because it preserves the Bevill exclusion for mixtures that are characteristically hazardous due to Bevill wastes, but nonetheless ensures that the Bevill Amendment is not used to allow Bevill wastes to shield/immunize non-Bevill hazardous wastes from regulatory controls that would otherwise apply to those wastes.

d. Response to Court Remands Dealing with Other Issues Relating to Mineral Processing and to Scope of Bevill Exclusion. (i) Toxicity Characteristic Leaching Procedure (TCLP) The applicability of the TCLP test to mineral processing wastes was challenged in *Edison Electric Institute* v. *EPA,* 2 F.3d 438 (D.C. Cir. 1993). In that case the Court held that the Agency must provide at least some factual support that the mismanagement scenario assumed in developing the TCLP is plausible when applied to mineral processing wastes or, alternatively, that mining wastes are exposed to conditions similar to those simulated by the TCLP, namely ''contact with some form of acidic leaching media''. 2 F. 3d at 447. EPA prepared a technical background document in support of the January, 1996 proposal, which presented data on this issue. This report concluded that mineral processing wastes had in the past been co-disposed with municipal wastes, and due to the location of mineral processing plants near large urban areas, it was plausible that these wastes could be mismanaged with municipal wastes. EPA also solicited information from the public that would help the Agency evaluate industry comments that the Synthetic Precipitation Leaching Procedure (SPLP) would provide a more accurate measure of how mineral processing wastes behave in the environment. EPA received extremely limited data from the public on this issue.

EPA has concluded, based on the information available to the Agency and review of public comments, that co-disposal of mineral processing wastes with municipal wastes is a plausible mismanagement scenario and that, therefore, application of the TCLP to these wastes continues to be appropriate. Moreover, comments from industry during the rulemaking stated that certain facilities co-manage mineral processing wastes with extraction and beneficiation wastes. Given the well-documented, acidic nature of some extraction and beneficiation wastes, mineral processing wastes disposed of in this manner may be subject to the kinds of low pH conditions that are reflected in the TCLP. For this additional reason, EPA finds that, under the plausible mismanagement standard articulated in *Edison Electric,* application of the TCLP to mineral processing wastes is appropriate in light of the information at the Agency's disposal. While the Agency has received comments seeking to compare the TCLP and the SPLP, the Agency has concluded, for reasons discussed later in this preamble, that this information is not sufficient to support adopting the SPLP as the appropriate test for mineral processing wastes at this time.

The Agency recognizes that the methodology underlying the TCLP may not reflect the variety of conditions under which some types of mineral processing wastes are disposed. As a result, the Agency will undertake, and within three to five years, conclude a review of the appropriateness of using the TCLP and other leaching protocols in this and other contexts.

(ii) Listed Hazardous Wastes. In *American Mining Congress* v. *EPA,* 907 F.2d 1179 (D.C. Cir. 1990), the Court found that the Agency's record regarding the listings of five waste streams (K064, K065, K066, K090, K091) did not adequately address certain issues raised in comments. EPA indicated its intent not to list these five waste streams in the January, 1996 proposal and placed a technical background document in the docket enumerating the reasons for those decisions. Many of these wastes are either no longer generated, or managed in a fashion not warranting listing. EPA did not receive any comments challenging those proposed decisions. Therefore, in this rule, EPA is not listing these five smelting wastes as hazardous wastes. Instead, EPA will rely on the RCRA hazardous waste characteristics to identify those portions of the wastes requiring management as hazardous wastes.

(iii) Titanium Tetrachloride. In 1989, EPA determined that wastes from the production of titanium tetrachloride were mineral processing wastes. DuPont challenged this decision, and the Court remanded EPA's decision for further consideration on grounds that the Agency's decision was unclear (see *Solite Corporation* v. *EPA,* 952 F.2d at 494–95 (D.C. Cir. 1991)). EPA reevaluated data on wastes from the production of titanium tetrachloride, and placed results of this reevaluation in the docket in support of the January 1996 proposal. EPA also has met with representatives of DuPont to discuss their process further. Based on the Agency's reevaluation of this issue, EPA, in this rule, concludes that iron chloride waste acid generated from the chloride-ilmenite process of titanium tetrachloride production should be classified as a mineral processing waste. The Agency has reached this decision because this process significantly affects the physical/chemical structure of the raw feedstock through chlorination and this reaction creates new chemicals (iron chloride and titanium tetrachloride gases). This meets the definition of mineral processing rather than beneficiation.

(iv) Air Pollution Control Dust and Sludges Generated From Lightweight Aggregate Production. Finally, since 1995, the Agency has conducted reviews of air pollution control dust and sludges generated from lightweight aggregate production, and has met with representatives of this industry sector. The Agency also has issued a Report *to Congress* and a regulatory determination on Cement Kiln Dust (CKD) (59 FR at 709, January 6, 1994 and 60 FR at 7366, February 7, 1995). EPA has found that some aggregate kilns and cement kilns use hazardous waste fuels to fire their units. Both types of facilities generate dusts which may be either reintroduced into the kiln or blended into the final product. While these dusts rarely exhibit any of the RCRA hazardous waste characteristics, the resultant product could be classified as hazardous waste due to the ''derived from'' rule if listed hazardous wastes are combusted. The Agency is seeking a way to encourage the legitimate and environmentally sound reuse of dusts, from both cement and lightweight aggregate manufacture. In an effort to develop a consistent regulatory approach, EPA, therefore, has decided to defer any decision on the Bevill status of air pollution control dust and sludges generated from lightweight aggregate production until evaluation of issues related to CKD and lightweight aggregate dust handling, use, and disposal can be completed.

e. Reexamination of Bevill Exempt Wastes. The May 12 proposal sought general comment on whether a reexamination of some Bevill waste is warranted given that additional risk assessment techniques and additional information are available since making the 1986 Bevill regulatory determination (51 FR at 24496, July 3, 1986) on mining and the 1991 Bevill regulatory determination on mineral processing (56 FR 27300, June 13, 1991). EPA presented information from Superfund sites and other sources which indicate that some Bevill wastes continue to cause environmental damage (see environmental damage and risk technical background documents placed in the January 1996, and April, 1997 dockets). The Agency also posed the question of whether some waste streams require additional study or regulatory controls. Today's rule is not making any changes to the status of Bevill exempt extraction and beneficiation wastes or the 20 exempt mineral processing wastes.

C. Analysis of and Response to Public Comments

1. Jurisdiction

a. EPA Authority to Regulate Mineral Processing Secondary Materials Reclaimed Within the Industry. Many industry commenters maintained that EPA lacks jurisdiction over mineral processing secondary materials reclaimed within the industry because such materials cannot be ''solid wastes.'' The argument is straight-forward: a solid waste regulated under RCRA must be a ''discarded material,'' RCRA section 1004 (27), and these materials are not discarded. The comments suggest that, under the case law, (in particular *American Mining Congress* v. *EPA,* 824 F. 2d 1177 (D.C. Cir. 1987) (''*AMC I*'')), these materials are part of an on-going production process within the generating industry, and so cannot be ''discarded.''

EPA disagrees that there is an absolute jurisdictional barrier to regulating any management of mineral processing secondary materials which are reclaimed within the industry. Although the *AMC I* court found that, in some respects EPA's 1985 rules exceeded the statutory grant of authority, subsequent judicial opinions have sharply limited the scope of *AMC I.* The only absolute bar on the Agency's authority to define recycled mineral processing secondary materials as solid wastes is for ''materials that are 'destined for *immediate reuse* in another phase of the industry's ongoing production process' and that 'have not yet become part of the waste disposal problem.''' *American Mining Congress* v. *EPA,* 907 F. 2d 1179, 1186 (D.C. Cir. 1990) (''*AMC II*'') quoting *AMC I,* 824 F. 2d at 1186.[2]) The case law likewise makes clear that ''discarded'' is an ambiguous term, within EPA's discretion to interpret, consistent with RCRA's overall goals and purposes. *AMC II,* 907 F.2d at 1179; *American Petroleum Inst.* v. *EPA,* 906 F.2d 726, 741(D.C. Cir. 1990).

Applying this test, today's rule states that any mineral processing secondary materials which are being reclaimed immediately within the mineral processing industry (or within beneficiation) are not a solid waste. However, as explained below, EPA does not view mineral processing secondary materials which have been removed from a production process for storage as being ''immediately reused,'' and so such materials are not automatically excluded from jurisdiction. EPA reiterates that there is a jurisdictional bar against regulating the actual production process (see *Steel Manufacturers Association* v. *EPA,* 27 F.3d 642, 647 (D.C. Cir. 1994); EPA also interprets the holding of *AMC I* to mandate this result), so today's rule does not assert authority over mineral processing production units. However, if production units are also used to dispose of hazardous wastes, those units are subject to RCRA Subtitle C.

With respect to mineral processing secondary materials which are stored before being reclaimed at mineral processing or beneficiation facilities—i.e. that are not being immediately reused—the Agency has established a conditional exclusion from the definition of solid waste, the conditions being designed to assure that management of these materials are not ''part of the waste disposal problem.'' The main condition is that mineral processing secondary materials not be stored on the land (except for storage on approved pads) and not be stored in disposal units.

In considering the question of scope of jurisdiction, it is useful to remember that this rule applies to a continuum of potential recovery practices. At the one end of the continuum, where EPA's authority is most certain, would be the situation where mineral processing company A sends its secondary materials to unrelated mineral processing company B processing a different metal than company A. The case law indicates that EPA retains discretion to classify the material as a solid waste. *API,* 906 F.2d at 741 (transfer of steel industry dust to a metal reclaimer processing exclusively steel industry secondary materials can involve a RCRA solid waste). It should be remembered that EPA views ''mineral processing'' broadly in this rule to include all primary mineral processing sectors (see, e.g., the Agency's 1996 *Identification and Description of Mineral Processing Sectors and Waste Streams*). This document identified 41 different sectors involved in primary mineral processing. Primary mineral processing involves changing the physical and chemical structure of ores and minerals. For example, mineral processing includes the production of steel and the production of gold. These sectors generate very different types of wastes and recycle them under different conditions. Thus, the *API* principle of no absolute jurisdictional bar applies.

Points further in on the continuum would be if companies A and B process the same metal but are unrelated companies (also potentially within the *API* framework), and where companies A and B are under common ownership but not at the same site. The point on the continuum closest to on-going production is where secondary materials are reclaimed at the generating site, but where the process is non-continuous due to storage of materials. Immediate recovery on-site without storage would then mark the other end of the continuum, and would illustrate when materials are immediately reused within a continuous process, and so

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[2] The other cases which have similarly stressed this narrow reading of *AMC I* are *American Petroleum Inst.* v. *EPA,* 906 F. 2d 726, 741 (D.C. Cir. 1990); *Shell Oil* v. *EPA,* 950 F. 2d 741, 755–56 (D.C. Cir. 1991); *Chemical Waste Management* v. *EPA,* 976 F. 2d 2, 14 (D.C. Cir. 1992); *United States* v. *Ilco, Inc.,* 996 F. 2d 1126, 1131 (5th Cir. 1993); and *Owen Electric Steel Co.* v. *Browner.* 37 F. 3d 146, 149–50 (4th Cir. 1994).

absolutely outside Subtitle C jurisdiction.[3]

EPA believes that it has discretion to consider whether any of these situations short of immediate reuse involve solid wastes, this discretion being limited by the second part of the Court's articulated test: is the non-continuous management of the mineral processing secondary materials part of the waste disposal problem. Thus, EPA in today's rule has focused on the storage of these materials. The leading authority for this approach is *AMC II,* where the Court found that secondary materials generated and reclaimed on-site could be classified as solid wastes because they were stored in surface impoundments. 907 F. 2d at 1186. The case involved a single plant which stored its secondary materials —sludges—in an impoundment before reclaiming all of the accumulated sludges in its own smelting process. 50 FR at 40292, 40296 (October 1985). Several comenters argued that *AMC II* involved only spectutlative accumulation. This is not the case. The wastes generated in the impoundment were actually recycled 100 percent, not stored with expectation of recycling. 50 FR at 40292, 40296; Brief of Petitioner Amercian Mining Congress in *AMC II* (filed March 30, 1990) pp. 18, 29. The Court nonetheless held that the sludges were discarded, stressing the special sensitivity in RCRA to land-based units such as surface impoundments, and explaining how storage of secondary materials in such units can be part of the waste disposal problem (907 F. 2d at 1186–87). Thus, EPA believes that mineral processing secondary materials stored on the land are discarded.

Land-based storage of mineral processing sludges, spent materials, and by-products can be viewed by EPA as being part of the waste disposal problem. There is no dispute that a considerable amount of mineral processing secondary materials contain hazardous constituents that can threaten human health and the environment (see U.S. EPA, Office of Solid Waste, *Human Health and Environmental Damages from Mining and Mineral Processing Wastes,* 1995, and *Damage Cases and Environmental Releases,* 1997). Land-based units, and impoundments in particular, have certain inherent indicia of discard due to their inability to prevent releases of contained materials. RCRA section 1002(b)(7); *AMC II,* 907 F.2d at 1187; 53 FR at 521, 525 (Jan. 8, 1988). Surface impoundments pose essentially inherent risks of groundwater contamination due to the hydraulic pressure created by the contained liquids. *Chemical Waste Management* v. *EPA,* 919 F. 2d 158, 166 (D.C. Cir. 1992). There are many damage incidents which involve storage of mineral processing wastes in piles and surface impoundments, some of which involve mineral processing secondary materials stored in land-based units before eventual reclamation. These damage incidents confirm that this potential harm is not hypothetical.

It should be noted that there is Agency precedent for the limitation on land based storage as part of within-industry recycling practices. The Agency established the principle of encouraging recycling without allowing land-based storage at 40 CFR 261.4(a)(10). Any wastes from coke by-product production are not solid wastes if recycled to coke ovens conditioned on there being no land disposal from the point of generation to the point of recycling. The Agency also has promulgated a rule where recovered oil generated by any facet of petroleum exploration, production, and retailing is not a solid waste conditioned on no management of these materials in land-based units (see 59 FR 58936, July 28, 1994). The Agency has also proposed to extend this principle to a wider range of oil-bearing secondary materials (see 60 FR 57747, 57753, November 20, 1995). The condition likewise appears in current rules at 40 CFR 261.2(e)(iii) where it qualifies the exclusion for materials returned for reclamation in the process from which they are generated. The application of a no land placement condition in today's rule is, therefore, building on an established policy of encouraging recycling conditioned on no land placement.

Putting this together, the Agency reads the statute as creating an absolute jurisdictional bar in two situations: where mineral processing or beneficiation is occurring, and where reclamation is continuous in the sense that there is no interdiction in time—i.e. materials moving from one step of a recovery process to another without a break in the process, as for storage. As one moves back along the continuum, EPA has discretion to interpret whether secondary materials may be considered discarded. The Agency is exercising that discretion here by putting its focus on whether the reclamation, or more precisely, the storage which precedes reclamation, is part of the waste disposal problem because it involves storage which can be and has been part of that problem.

b. Are There Limits on Jurisdiction? (Response to Public Interest Group Position). In contrast, representatives of public interest groups argued that the Agency's authority was essentially unlimited. They believe that the authority should be extended, at a minimum, to all land-based units because such units are a type of disposal unit. With respect to mineral processing secondary materials that are managed in tanks, containers, or buildings (i.e. in other than land-based units), EPA sees no principle that compels the materials to be designated as solid wastes. As explained above, case law indicates that EPA has discretion to interpret which materials are ''discarded'' consistent with the overall statutory objective, *API,* 906 F.2d at 742. These objectives include not only assuring safe management of hazardous wastes, but also ''encouraging . . . materials recovery, [and] properly conducted recycling and reuse . . . .'' RCRA section 1003(a)(6). EPA's construction in today's rule, which rests largely on the distinction between land-based storage and more environmentally protective storage of secondary materials, is consistent with this object by encouraging ''properly conducted recycling. . . .'' In addition, EPA reads the case law as allowing the Agency to make reasonable distinctions among secondary material handling practices in determining when a particular recycling practice may be considered to be ''part of the waste disposal problem.'' Finally, as EPA explained at proposal, there are potential jurisdictional constraints given that the mineral processing industry exists to recover mineral values from an initial raw material, and some aspects of recovery of mineral values from secondary materials can be like sequential processing of an initial raw material. 61 FR at 2342. Where there is no obvious element of discard present, such as land-based storage, the Agency does not believe that it should exercise its interpretive discretion to assert authority.

With respect to intra-industry reclamation practices involving land-based units, EPA largely is asserting authority. EPA proposed a series of conditions that would have allowed land-based storage units on the idea that there were certain unique necessities within this industry compelling use of such units. 61 FR at 2341. However, as the rulemaking progressed, it became

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[3] The Agency indicated in its January 1996 proposal that some lower value mineral processing secondary materials are from ancillary production operations and that those materials were often placed in land-based storage units. 61 FR at 2340. Industry comments challenged this discussion as over broad and misplaced. Upon review, the Agency acknowledges that mineral processing facilities generate a wide range of secondary materials, which also have a wide range of values to the facility owner.

apparent that there are no such production-related necessities. Agency reevaluation of mineral processing secondary material volumes indicated that, in addition to volumes being lower than EPA initially believed, comparison to volumes of other industrial hazardous wastes indicated that these wastes were often higher in volume than mineral processing secondary materials and were being stored off the land. Consequently, the Agency is claiming authority over most land-based storage units.

The Agency is not, however, asserting authority over piles resting on pads determined by a state or EPA to be protective. The reasoning is similar to that for not claiming authority over within-industry secondary materials stored in tanks, containers or buildings. Such materials need not be viewed as ''part of the waste disposal problem,'' and so, given the intra-industry recycling, need not be considered ''discarded.'' The practice also can be viewed as a type of ''properly conducted recycling'' which should be encouraged. Again, EPA views this determination to be within its interpretive discretion.

EPA also disagrees that it is compelled to assert control over land-based units that are actual production units, i.e. that actually recover product. The Agency is aware of only two land-based units which recover metals: gold heap leach piles and copper dump leach piles. Under prior rulemakings (54 FR 36592 and 55 FR 2322), the Agency has defined these land-based units as extraction/beneficiation activities. The Agency is unaware of any other land based process units which actually recover metals. The Agency believes that regulating such units could pose the possibility of interdicting actual production steps which was the particular focus of the *AMC I* court. EPA notes, however, that storage units which also make secondary materials more suitable for actual recovery, such as equalization basins, can remain within Subtitle C jurisdiction. These units, in the Agency's view, are not the part of the process which actually produces an end product (such as the smelter at a smelting facility). At most, they facilitate eventual recovery. The Agency does not read the case law to say that such storage units are in all cases outside the authority of Subtitle C.

EPA also is not asserting authority over mineral processing secondary materials once they are removed from approved storage for reclamation. Thus, should a mineral processing plant reclaim mineral processing secondary materials after those materials are stored in land-based units (i.e. the materials defined as hazardous wastes in today's rule), they would no longer be solid and hazardous wastes. EPA believes it would be counterproductive to retain the hazardous waste status for mineral processing secondary materials entering reclamation. If the materials remain hazardous wastes, for example, the smelting process itself could be subject to Subtitle C regulation. EPA believes that it retains discretion to classify the removed materials as no longer being solid and hazardous wastes.

The Agency believes it has discretion to adopt this classification notwithstanding the court's decision in *American Petroleum Institute.* v. *EPA,* 906 F.2d 726 (D.C. Cir. 1990). In that case, the Court held that EPA had adopted the so-called indigenous principle, whereby secondary materials stopped being wastes at the point they were utilized as feedstock in a production process related to the one that generated it, without sufficient justification. 906 F.2d at 741–42. However, in that case, EPA had made no attempt to determine which materials were part of the waste disposal problem, and which were not. Here, the Agency is making clear that storage on the land of mineral processing secondary materials is the environmental concern, and that reclaiming mineral processing secondary materials within the industry is ordinarily a form of proper recycling which may permissibly be encouraged. RCRA section 1003(a)(6).

EPA also notes that it is possible that no mineral processing secondary materials will be placed in impoundments or in unapproved piles. Under today's rule, if a facility wishes to use a pile for storage (assuming the pile has not been adjudicated to be protective), the wastes would first have to be treated to meet Land Disposal Restrictions standards, probably rendering them unrecoverable. If an impoundment is utilized, wastes need not be pretreated, but the impoundment would have to meet minimum technology design standards and be dredged annually (RCRA section 3005(j)(11) and 40 CFR section 268.5) and, of course, ultimately obtain a RCRA permit. The Agency anticipates that facilities will use a non land-based form of storage instead.

c. Immediate Reuse.[4] In the May 1997 proposal, EPA suggested a different way of defining absolute jurisdictional limits, namely to say that secondary minerals generated by and ''immediately reused'' within the mineral processing industry, were not solid wastes. The reference to ''immediate'' was suggested as a means of interpreting the ''immediate reuse in another phase of the industry's ongoing process'' standard articulated in the case law. *AMC I,* at 824 F. 2d at 1185. The Agency proposed that secondary materials that were legitimately recycled within 48 hours would be outside RCRA jurisdiction, regardless of whether they were stored between process steps (including storage in land-based units). See 62 FR at 26051.

Industry and public interest groups both opposed the use of the 48-hour time limit included in the January 1996 proposal to define immediate reuse. Industry renewed its categorical objections based on *AMC I,* and noted that many secondary materials are legitimately reclaimed long after they are generated and the time period between generation and reclamation in no way affected their value. For example, commenters stated that the gold industry generates retort slags which contain gold values. Comments stated that these slags are stored off the ground for periods up to six months after which they are reintroduced into their recovery process.[5]

Public interest groups objected to the 48-hour limit on the basis that an absolute waiver of RCRA jurisdiction based on time does not translate to any reduction of environmental risk. Public interest groups also noted that the Court in *AMC II* granted jurisdiction to units holding secondary materials with the propensity to leak, and that the Court's opinion would extend to all land placement, since the continuous placement of materials on piles or other land-based units would result in the same ''discard'' underlying the Court's opinion.

Although the Agency necessarily accepts that materials immediately reused in another phase of the industry's ongoing production process are beyond EPA's jurisdiction, *AMC I,* 824 F.2d at 1185, the Agency is not adopting in today's rule the proposed 48-hour approach to define immediate reuse. The Agency is defining ''immediate reuse'' as the continuous recirculation of secondary materials

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[4] It should be noted that EPA is not using ''reuse'' as a term of art in this section of the preamble (i.e. is not using the term as defined in 40 CFR 261.1(a)(5)), but rather is referring to immediate reclamation of materials (i.e. material recovery) at a mineral processing facility. The key concept here is actually ''immediate,'' which EPA is using to interpret the phrase ''continuous process'' used in the case law.

[5] It should be noted that since no land-based storage is involved, these gold slags are not solid wastes under the final rule in any case (assuming that the recovery is legitimate and that the other conditions in the rule are satisfied).

back into recovery processes without prior storage. The plain reading of the words ''continuous,'' 824 F.2d at 1193, and ''immediate'' preclude storage. Storage by its very nature means that processes are not continuous; rather, storage means that materials are generated which must be held apart for some period of time prior to reentry into a process. Storage, therefore, breaks the continuous and immediate nature of production and reentry. In addition, land-based storage units have inherent elements of discard. *AMC II,* 907 F. 2d at 1186–87.

The definition of ''immediate reuse'' in today's rule does not bar storage prior to recycling. Mineral processing industries will be able to store and recycle their mineral processing secondary materials outside RCRA Subtitle C requirements if they do so while meeting the conditions of the exclusion from the definition of solid waste contained in today's rule.

In the May 1997 proposal, the Agency discussed the possibility that some molten metals that spill onto the ground could be classified as materials undergoing immediate reuse (see 62 FR at 26051). The Agency noted that copper reverts (refined copper material) can be spilled in the process of being transferred from one part of the smelting process to another. Such reverts are picked up as soon as they can be safely handled and are placed directly back into the smelting process. The Agency has reviewed smelting processes in other metal sectors and finds that spillage from ladles is common and that these materials are routinely picked up within a short time and placed back into the process. The Agency thus concludes that molten metal spilled onto smelter floors is not a solid waste if it is picked up as practical (given heat and worker safety factors) and is then placed back into the smelting process. Such a material is not a secondary material (i.e. sludge, by-product, or spent material), but rather remains in process. This interpretation parallels existing rules, which say that a spilled commercial chemical product is not a solid waste if it is recycled within a reasonable amount of time (see 40 CFR 261.33 and 55 FR at 22671).

Industry commenters stated that spent smelter brick was similar to reverts since they are often returned back into recovery processes. If such spent bricks are stored before being recycled, they are not being immediately reused (nor are they still in process, since they are spent and physically removed). As noted in the Agency's May 1997 proposal, copper flue dusts, also are stored sometimes and not immediately recycled. Flue dusts not meeting the immediate reuse definition are defined as mineral processing secondary materials (usually a sludge, since these dusts are usually air pollution control residue) and would be eligible for the conditional exclusion to the definition of solid waste.

d. Relation to the Current Regulatory Definition of Solid Waste. (i) Distinctions among Sludges, By-products, and Spent Materials. The existing regulatory definition of solid waste classifies metal recovery operations as a type of reclamation activity, and then states that certain secondary materials being reclaimed are, or are not, solid wastes depending on the type of material being reclaimed. Spent materials being reclaimed are solid wastes, while characteristic sludges and by-products being reclaimed are not solid wastes. See, generally, 40 CFR 261.2(c)(3) and 50 FR at 633–34, 639–41 (January 4, 1985).

As EPA noted at proposal, these distinctions among types of secondary materials being reclaimed are not needed because they are not directly based on environmental distinctions. 61 FR at 2342. In this industry, at least, the distinctions do not relate to which of these materials may be part of the waste disposal problem.[6] The more environmentally meaningful distinction, and the one adopted here, is between land-based storage and storage in tanks, containers, and buildings.

In this rule, the Agency is, therefore, eliminating the regulatory distinctions between by-products, sludges and spent materials from mineral processing when these materials are reclaimed. Thus, under the amended rule, if any secondary material—sludge, by-product, or spent material—is legitimately reclaimed within the mineral processing industry, it is not a solid waste as long as all other conditions to the exclusion to the definition of solid waste are satisfied. EPA believes that this principle not only should encourage properly conducted recycling within the industry, but also fulfills an Agency objective of reducing some of the complexity in the existing regulatory definition of solid waste.[7]

(ii) Other existing regulatory exclusions. The existing regulatory definition of solid waste also contains a series of exclusions in 40 CFR 261.2(e), two of which could apply to the mineral processing industry. Section 261.2(e)(1)(ii) excludes from the definition of solid waste sludges, by-products and spent materials (i.e. secondary materials) which are ''used or reused as effective substitutes for commercial products.'' An example could be mineral processing acid plant blowdown substituting for commercial acid in another process (either mineral processing or a process in a different industrial category).[8] Commenters from industry questioned whether this provision is affected by the amendments relating to mineral processing secondary materials being reclaimed. The answer is that the provision remains as an independent basis for excluding secondary materials from Subtitle C. EPA did not propose to change it, and the issues involved, in any case, would be broader than the present proceeding since the basis for the exclusion does not rest on the notion of a continued process within an industry, but on comparability of secondary and virgin materials (see 50 FR at 619–20 and 637–41 (Jan. 4, 1985)).

The second existing exclusion, found at 261.2(e)(1)(iii), does overlap with the present rule. The exclusion is for secondary materials ''returned [as a substitute for feedstock materials] to the original process from which they are generated, without first being reclaimed or land disposed.'' An example could be an emission control dust from primary smelting which is returned directly to the smelter for metal recovery without any interim land disposal.

This provision is essentially consistent with, but also subsumed by, today's final rule (with respect to the mineral processing industry). It is subsumed because the activity involved, return as a feedstock to a smelter, is a type of reclamation activity (see 50 FR at 639–40), the subject of this final rule.[9] The existing rule also contains a ''no

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[6] Put another way, the fact that a mineral processing secondary material is a sludge, rather than a spent material or by-product, does not convey any meaningful information as to the types of risks the material might pose if reclaimed.

[7] EPA does note the potential anomaly that non-mineral processing secondary materials, at least for the moment, will be regulated in some cases stringently than those generated and reclaimed within the mineral processing industry. This could come about because non-mineral processing industry sludges and by-products would still not be solid wastes if reclaimed, and so could be stored in land-based units before reclamation without being solid wastes. EPA has chosen, however, to address the broader issues regarding the regulatory definition of solid waste in a different rulemaking effort, which is proceeding on a different schedule from this rule. EPA believes that if may legitimately proceed one step at a time on these issues, and so is not precluded from making needed changes to the regulatory definition that affect only discrete industry segments, in this case, the mineral processing industry.

[8] This example assumes that legitimate recycling is occurring.

[9] The exclusion for return of secondary materials as feedstock was in fact adopted largely in order to exclude certain direct reclamation practices in the mineral processing industry. 50 FR at 639–40.

land disposal'' condition similar to the conditions in this final rule (although today's rule excludes storage in piles in some circumstances, and so is more flexible than the current 261.2(e)(1)(iii) in this respect).

In light of this overlap, EPA is adding language to 261.2(e)(1)(iii) to indicate that there are special provisions relating to reclamation within the mineral processing industry (namely those adopted in today's final rule), and that these provisions define the scope of the exclusion for mineral processing secondary materials generated and reclaimed within the industry, including those which are returned to a mineral processing operation from which they are generated without first being reclaimed.

Today's rule also does not alter the regulatory status of recyclable materials that are reclaimed to recover economically significant amounts of gold, silver, platinum, iridium, osmium, rhodium, ruthenium, or any combination of them. 40 CFR 266.70. This rule was established to encourage recycling of precious metals. Commenters from the gold industry questioned whether this provision is affected by the amendments relating to mineral processing secondary materials being reclaimed. The answer is that today's rule redefines which secondary materials generated and reclaimed within the mineral processing industry are wastes, and so could exclude certain materials reclaimed within the precious metal industry which are now defined as solid wastes. However, to the extent any precious metal recovery operations remain subject to regulation after today's rule, the tailored regulatory provisions in 266.70 continue to apply.

e. Otherwise Excluded Mineral Processing Units Which Serve as Disposal Units. As the Agency noted in the original proposal, land-based units in the mineral processing industry not only can be related to a recovery process but also can serve as repositories of conventional wastes. 61 FR at 2340, 2342, 2347. That is, unusable solids settle in surface impoundments or are left in piles and in many cases these units become the ultimate repositories for these wastes. *Id.*

Under current rules, when an operating product storage unit that is a tank also contains a hazardous waste, the waste is not subject to regulation until it exits the unit. 40 CFR section 261.4 (c). An example would be a listed distillation column bottom remaining within the distillation column.

Section 261.4(c) does not apply to hazardous wastes which accumulate in land-based units. Thus, if wastes accumulate in piles or impoundments, if those wastes are hazardous (i.e. are listed or exhibit a characteristic of hazardous waste), and the wastes are not legitimately recycled, then the units are Subtitle C regulated units because they are being used to store or dispose of hazardous waste. The Agency is not altering this long-standing principle in the present rule (particularly given the central statutory finding that land-based units, and especially surface impoundments, ''should be the least favored method for managing hazardous wastes'; RCRA section 1002(b)(7)). Consequently, any process impoundment that holds un-recycled hazardous accumulated solids, the impoundment is a regulated unit (i.e. subject to Subtitle C) because it is disposing of a hazardous waste. In addition, the same principle would apply to storage or process piles, which likewise are ineligible for the 261.4(c) exemption.

2. Scope of This Rule

This section of the preamble addresses the issue of which secondary materials come from ''mineral processing'' operations, and so are potentially within the scope of the conditional exclusion for mineral processing wastes being reclaimed within the mineral processing industry sector or in extraction/beneficiation operations. Newly identified wastes from mineral processing also are subject to the LDR prohibitions and treatment standards adopted today, and so this preamble section also clarifies the applicability of these LDR provisions.

a. Mineral Processing Wastes Covered by This Rule. The Agency's 1989 rule (see 54 FR 36592) applied the high volume/low toxicity criteria to determine which primary mineral processing wastes would retain the Bevill exclusion. This rule also clarified the Bevill status of beneficiation operations. Those mineral processing waste streams not meeting the high volume/low toxicity criteria are no longer Bevill exempt wastes and are subject to regulation under Subtitle C (except 20 mineral processing waste streams noted at 40 CFR 261.4). Non-exempt Bevill mineral processing wastes are ''newly identified,'' and are now subject to the Land Disposal Restrictions, when land disposed. Therefore, only ''newly identified'' characteristic hazardous mineral processing wastes are potentially eligible for the conditional exclusion from the definition of solid waste.

EPA established in the 1989 rulemaking the factors it would use to determine whether a waste is generated from extraction/beneficiation versus mineral processing (see 54 FR 36592, 36616–20). The Agency has not and is not reopening this standard. However, EPA prepared and noticed a report—*Identification and Description of Mineral Processing Sectors and Waste Streams*—which tentatively applied this existing test on a waste-by-waste basis to wastes from 41 mineral sectors (62 FR at 2354).

There are two principal issues raised by this report: its legal status and its accuracy. First, the Agency has decided that the *Identification and Description of Mineral Processing Sectors and Waste Streams* report should be a guidance document. Thus, the Report is not a rule, and it, therefore, cannot be invoked as a definitive determination as to whether or not a particular waste is to be classified as being from mineral processing or from extraction/beneficiation. In addition, this report should not be viewed as an exclusive list of mineral processing and associated waste streams: other mineral processing waste streams may exist. Mineral processing facilities are obligated to determine the Bevill status of their wastes by utilizing applicable regulatory provisions, as clarified by the criteria articulated in 1989 in the **Federal Register** preamble cited above. Thus, because the document is guidance, no party could rely upon that document as the definitive basis for a regulatory determination.

The Agency has fully evaluated comments suggesting that the report contains factual inaccuracies, and believes that the Report, as now revised after review of public comments, is accurate and should therefore, provide useful guidance to the public. EPA disagrees with comments contenting that the Agency adopted new criteria in reaching the tentative conclusions set out in the Report. This is not the case—the same general approach used in 1989 was applied in the Report, and would have to be applied in making any actual regulatory determination.

One commenter argued that considering these determinations to be advisory would violate EPA's duty under section 3001(b)(3) of RCRA, as construed by the Court in *EDF V. EPA*, 852 F.2d 1316, 1331 (D.C. CIR 1988) to have made final determinations as to which mining wastes are subject to the Bevill exclusion. According to this commenter, reaching one conclusion at headquarters and a potentially different conclusion at EPA regions or States would undermine the intent of the Court's order in *EDF*. This commenter also asserted that such an approach would effectively allow States to regulate less stringently than EPA, in violation of sections 3006 and 3009 of RCRA.

EPA believes that these comments are erroneous. EPA fulfilled some time ago its obligations under section 3001(b)(3) generally, and under the *EDF* decision in particular, to define the scope of the Bevill exclusion as it applied to mining wastes. See 51 Fed. Reg. 24496 (July 3, 1986); 54 Fed. Reg. 36592 (Sept. 1, 1989); 55 Fed. Reg. 2322 (Jan. 23, 1990); 56 Fed. Reg. 27300 (June 13, 1991). As discussed in those notices and rules, EPA's regulatory determination did not obviate the need to evaluate whether a particular waste was from mineral processing which, unless one of the 20 identified special mineral processing wastes, would not be exempt from Subtitle C under Bevill. Indeed, the Agency has extensively discussed the distinctions between beneficiation and mineral processing precisely to assist industry, EPA and the States in making such case-specific determinations. See 54 Fed. Reg. 36618–36619 (Sept. 1, 1989). Issuance of the Identification document in the record for this rulemaking is simply intended to aid the industry and regulators in making these decisions.

EPA acknowledges that the potential for inconsistent determinations exist; for this reason, EPA headquarters has assisted regional offices and States in making these determinations over the past decade. Section 3001(b)(3) does not, however, require the Agency to use rulemaking to make each and every decision. Those decisions that are very fact-specific may need to be made on a case-by-case basis using general criteria articulated nationally by EPA. It is precisely because of the fact-specific nature of such inquiries that EPA believes adopting the guidance document as ''binding'' would not be appropriate. Finally, nothing in EPA's approach is inconsistent with the RCRA requirement that authorized State programs be at least equivalent to and no less stringent than the federal program (see RCRA 3006 (b)).

b. Wastewater Treatment Surface Impoundments. EPA indicated at proposal that wastes managed in wastewater treatment surface impoundments would never be eligible for a conditional exclusion from the definition of solid waste. 62 FR at 2348. (A wastewater treatment surface impoundment is one whose ultimate discharge is regulated by the Clean Water Act, and can include zero discharge facilities.) This remains EPA's position, although the issue is no longer directly relevant to the final rule because no impoundments are eligible for exclusion. As the Agency noted at proposal, the essential purpose of these units is waste management rather than production. 62 FR at 2348. See also *AMC II,* where the D.C. Circuit held that wastewater treatment surface impoundments can be classified as waste management units, notwithstanding that all of the entrained solids in the unit were eventually recycled as feedstock at the generating plant. 907 F. 2d at 1186–87.18 [10]

c. Materials Outside the Scope. This rule limits the use of the conditional exclusion to the definition of solid waste to only those secondary mineral processing materials generated within primary mineral processing. The Agency identified over 40 mineral sectors which potentially generate mineral processing secondary materials subject to this rule. The scope of this rule is therefore quite broad. The Agency did not receive comments opposed to the Agency including them in this rule.

This rule also restricts the use of the conditional exclusion from the definition of solid waste to characteristically hazardous mineral processing materials. Thus, no listed hazardous wastes can qualify for the conditional exclusion.

The National Mining Association (NMA) and the Metals Industry Recycling Coalition submitted comments urging the Agency to broaden the scope of the rule to include metal-bearing wastes generated outside of primary mineral processing as well as allowing the reprocessing of listed hazardous wastes. The Agency is not extending the exclusion contained in this rule because the Agency did not propose addressing wastes generated outside of primary mineral processing, since at the time of proposal the Agency indicated that these wastes would be addressed under a different rulemaking. While metal-bearing wastes generated outside of primary mineral processing, and listed hazardous wastes are not within the scope of this rule, the Agency will continue to assess how best to encourage their legitimate recycling.

Commenters indicated they were unsure how this rule would affect the application of 40 CFR 261.2 to secondary materials generated from outside the mineral processing industry sector. As discussed earlier in the preamble, today's rule does not amend § 261.2 for any secondary materials other than those generated within the mineral processing sector. Thus, when fully implemented, a mineral processing facility can use the conditional exclusion to the definition of solid wastes and can utilize § 261.2 to recycle other wastes.

3. Mineral Processing Secondary Material Volumes and Environmental Damages

a. Volume of Secondary Materials and Large Volume Exemption. In the Agency's May 1997 proposal, land placement of secondary mineral processing materials would be prohibited except for materials exceeding the high volume criteria (45,000 tons per facility waste stream per year for solid wastes and one million tons per facility per waste stream per year for liquids). The May 1997 proposal would have allowed high volume secondary materials to be placed in land-based units if those units meet the integrity standards noted in the January proposal and meet other proposed conditions. In today's rule, the Agency is adopting a no land placement condition for mineral processing secondary materials without any volume exemption.

As noted in the May 1997 proposal (see 62 FR at 26049), the Agency reevaluated the volumes of mineral processing secondary materials as a result of comments submitted by public interest groups which asserted that volumes of these materials were considerably less than EPA originally believed (see *Characterization of Mineral Processing Wastes and Materials,* U.S. EPA, 1998). Based on this reevaluation, the Agency finds that mineral processing wastes are not generated in the high volumes that we previously believed to be the case. EPA found that of the 119 hazardous wastes streams it studied, 117 were generated in volumes lower than the proposed high volume cutoff. Further, comments from public interest groups on the Agency's May 1997 proposal indicate that two remaining waste streams that

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[10] Waters in these impoundments are often recycled back into processes for their value as water. Recycling of wastewaters may be currently allowed under the effective substitute clause in the regulatory definition of solid waste (see 40 CFR 261.2(e)(1)(ii)), a provision unaffected by today's amendments. However, EPA reads *AMC II* and its regulations to state that impoundments where some wastewaters are returned to a process as an effective substitute for a commercial product, but which also function as wastewater treatment impoundments, would be regulated units (assuming there are hazardous wastes in the unit). This is because the unit would necessarily be functioning at least partially as a disposal unit (since wastewaters are ultimately discharged). In addition, the product storage regulatory exemption at 40 CFR 261.4(c) does not apply to surface impoundments. Notwithstanding industry comments that recycling of wastewater should be encouraged, the Agency notes the stronger policy in RCRA to assure that surface impoundments managing hazardous waste are managed so as to operate protectively. *AMC II,* 907 F.2d at 1187 and sources there cited.

the Agency had classified as high volume may not in fact meet the high volume cutoff. The Agency reassessed how it estimated the volumes of these waste streams and acknowledges that it used very conservative approaches to estimate these volumes. It is, therefore, possible that none of the 119 waste streams studied meet the high volume cutoff. The Agency proposed using the high volume cutoff as an indicator that land storage may be an economic necessity because when volumes are high, alternatives to land placement are costly and not practical. In fact, the Agency now finds that mineral processing secondary materials are generated at volumes where there is no reason that they cannot be managed in non-land based units (except for solids placed on approved pads).

Industry comments maintained that it is impractical to place mineral processing secondary materials in tanks, containers, and buildings. Based on the storage of similar volumes and types of hazardous wastes generated in other industries, the Agency does not agree. The Agency presented its analyses of volumes in its report entitled, *Characterization of Mineral Processing Wastes and Materials*, 1997. This report noted that listed hazardous wastes, such as spent potliners, and electric arc furnace dusts, are generated at volumes which generally exceed that of mineral processing secondary materials yet are stored in tanks and buildings. Further, this report noted that the volumes generated by other industries that use tanks, containers, and buildings to store hazardous wastes are not substantially different than volumes generated by the mineral processing industry.

b. Reliability of Damage and Environmental Release Reports. Industry commenters to the May 12, 1997 proposal sought to refute or minimize the degree of contamination caused by the land storage of mineral processing secondary materials. Despite these objections, the Agency still finds that land-based storage and management practices of mineral processing secondary materials and wastes can or may create or exacerbate soil and ground water contamination.

The Agency issued two separate reports in 1995 and 1997 (Office of Solid Waste, U.S. EPA, *Human Health and Environmental Damages from Mining and Mineral Processing Wastes* (1995), and Office of Solid Waste, U.S. EPA, *Damage Cases and Environmental Releases* (1997)) which presented information on damage cases and environmental releases of mineral processing and mining wastes. The data tended to fall into two general classes: (1) information that illustrates that environmental damages have occurred, and (2) information that discusses the types and magnitude of mineral processing materials that have been released into the environment. In some cases, a combination of feedstock, in-process materials, secondary materials, and wastes contribute to ground water, surface water, or soil contamination. Also, in some cases, contamination occurred through episodic or continuing mismanagement of hazardous and other solid wastes (e.g., commercial chemical spills). Industry commenters objected to the use of these damage cases contending that they reflect historic practices and not current operations.

The Agency disagrees that storage of mineral processing wastes, and in some cases secondary materials, on the ground, which was reflected in these reports, no longer occurs. After careful reevaluation, the Agency finds that the record and, in particular, these reports, clearly indicate that the storage on the ground of mineral processing wastes and secondary materials continues as a management practice and has caused environmental damage or has the potential to do so. These reports identify cases where mineral processing wastes and secondary materials were eroded by rain, were carried by wind, or, in the case of surface impoundments, migrated to contaminate ground water. The vast majority of newly identified mineral processing wastes are liquids and their placement in impoundments presents actual or potential threats to the environment. The Agency concludes that placement of secondary mineral processing materials in impoundments may contribute to the waste management problem.[11]

EPA is also not impressed by comments stating that most of the damage incidents involved wastes no longer utilized within a process, not secondary materials awaiting reclamation, and therefore are irrelevant to this rule. The damage incidents certainly show that when hazardous mining and mineral processing wastes and mineral processing secondary materials are stored in piles or in surface impoundments, hazardous constituent releases and consequent damage has occurred in this industry. Piles and impoundments do not automatically become safer if the materials stored in them are secondary materials awaiting recycling rather than wastes. Rather, the risk comes from the nature of the storage unit.

The Agency compared the toxic and hazardous properties of newly identified mineral processing wastes with a limited number of RCRA listed hazardous wastes in the 1997 technical background document, *Characterization of Mineral Processing Wastes and Materials*. This report was used to support the May 1997 proposal. In order to easily compare the listed waste leachate concentrations with the leachate concentrations of the newly identified mineral processing wastes, a combined mean and maximum range of chromium, cadmium, and lead concentrations for the seven listed wastes were calculated. The mean leachate concentrations for chromium, cadmium, and lead range from 6.03 mg/l to 273.23 mg/l, <0.01 mg/l to 117.5 mg/l, and 1.47 mg/l to 259.83 mg/l, respectively. Likewise, the maximum leachate concentrations for chromium, cadmium, and lead range from 12 mg/l to 4250 mg/l, <0.01 mg/l to 268 mg/l, and 2.10 mg/l to 1550 mg/l, respectively. The report then compared the ranges in constituent concentrations exhibited by the listed wastes and the newly identified mineral processing wastes. The report states that 15 of the 23 mineral processing wastes exhibit leachate concentrations of chromium, cadmium, and lead at levels that are equal to or greater than those levels exhibited by the seven listed wastes. Therefore, the Agency has concluded that some mineral processing secondary materials exhibit hazardous properties similar to listed hazardous wastes, and have the same or greater potential of leaching metals into the environment when they are improperly placed on the land.

In addition, mineral processing secondary materials often contain metal compounds and other constituents which, due to processing steps, become more mobile in the environment (see 54 FR 36614–36619, September 1, 1989). By the very nature of mineral processing, heavy metals are continuously concentrated and waste streams tend to contain higher metal loadings than those found in raw ore. Since the resultant wastes have higher concentrations of metals, they likewise have a higher potential to leach higher concentrations of metals into the environment if they are not adequately stored. Finally, the record also shows that a wide range of mineral processing secondary materials are released into the environment. Such releases do not necessarily mean that environmental

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[11] Of course, those mineral processing facilities that have in fact improved their storage practices for mineral processing secondary materials being reclaimed by using tanks, containers, or buildings instead of impoundments to store secondary materials would be essentially unaffected by this rule, since such units would be excluded from regulations.

damage has occurred; however, the Agency believes it must take appropriate steps to minimize such releases to reduce the potential for damage to occur, just as the Agency does with other hazardous wastes. RCRA is a preventive statute, designed to assure safe management of hazardous waste from cradle to grave to prevent the need for remediating releases. Based on the information noted above, the Agency therefore has finalized in today's rule a ''no land placement'' condition for the storage of mineral processing secondary materials.

Comments from public interest groups pointed out that a considerable amount of information shows that releases result from fugitive dusts and that control of dusts was not adequately addressed in the proposals. The Agency agrees that the release of fugitive dust should be addressed and believes that placement in tanks, containers or buildings will adequately address this concern. Mineral processing secondary materials stored in tanks or containers must be stored in a manner which effectively manages fugitive emissions. Moreover, as at proposal, if the site-specific pile approval process is utilized, the possibility of harm via an air exposure must be considered, and, if necessary, controlled. See 62 FR at 2372 (proposed 261.4(a)(15)(iv)(A)(3)).

4. Conditions to the Exclusion

In the January 1996 and May 1997 proposals, the Agency sought comment on how to establish a conditional exclusion to the definition of solid waste which would encourage recycling of mineral processing secondary materials and be protective. In today's rule the Agency is establishing a conditional exclusion to the definition of solid waste. The conditions relate to legitimacy of recycling, land placement, speculative accumulation, and notification, and are discussed below.

a. Legitimacy. It goes virtually without saying that only mineral processing secondary materials which are reclaimed legitimately would be excluded under today's rule. This is because sham recycling is simply waste treatment or disposal conducted under the guise of recycling. *See U.S. v. Self,* 2 F. 3d 1071, 1079 (10th Cir. 1993).

The Agency currently uses a qualitative approach for determining whether a material is being legitimately recycled. Factors the Agency considers typically relevant in making such determinations are found at 50 FR 638 (Jan. 4, 1985); 53 FR 522(Jan. 8, 1988); 56 FR 7145, 7185 (Feb. 21. 1991). Use of these factors to assess whether a particular activity is to be viewed as recycling rather than treatment or disposal was emphatically sustained by the Court in *Marine Shale Processors v. EPA*, 81 F. 3d 1371, 1381–83 (5th Cir. 1996) and *United States v. Marine Shale Processors*, 81 F. 3d 1361, 1366(5th Cir. 1996).

The main issue in this rulemaking was whether the Agency should develop quantified criteria for use in assessing legitimacy of reclamation activities within the mineral processing industry. The Agency proposed quantitative criteria including the potential use of an ore grade cut-off, normal operating range, efficiency standard, and an economic test. 62 FR at 2342–44. In addition to metal values, the Agency also solicited comment on legitimate recycling of acid, water, and other values.

The mineral processing industry noted in their comments that their products must meet international quality standards and they would not risk affecting product quality by introducing materials which would adversely affect that quality, and therefore that legitimacy can be assumed in essentially all cases. They also opposed the proposed quantified criteria.

While the Agency agrees that market forces generally may limit the introduction of materials which could adversely affect product quality, mineral processing facilities by their nature process large volumes of materials, EPA is concerned that small volumes of wastes could be placed into processes without contributing mineral values in order to treat or dispose of them. Obviously, this is not recycling, as noted by the Court in *U.S. v. Marine Shale Processors*, 81 F. 3d at 1366. The Agency, therefore, does not agree that there is no need to apply some type of reasonable legitimacy criteria.

Industry commenters also noted that application of quantitative criteria would be burdensome, are not necessary, and could not be effectively implemented. The Agency agrees that implementation of the proposed quantitative tests would have required significant testing of materials (and resultant costs) and that due to uncertainty in evaluating test results, companies may decide not to recycle any materials to protect the Bevill status of their resultant wastes. Application of an ore grade cutoff criteria could restrict the gold industry's ability to recover gold values from secondary materials that contain gold at levels below those found in ore. Such recovery could nevertheless be cost effective. Industry commenters stated that the application of a normal operating range test would be difficult to implement since operating parameters at large mineral processing facilities change often related to differences in feed. There also was little support from industry for the proposed efficiency test because such facilities may be recovering a specific metal at one recovery rate while they are recovering other metals at a different rates. Industry commenters also rejected the proposed use of an economic test because recycling need not be profitable to be legitimate. They specifically pointed out the cases where recycling was economical only relative to disposal, and yet, the company was legitimately reusing the recycled materials.

For these reasons the Agency has declined to adopt any of the proposed quantitative tests. In today's rule, the Agency is not adopting quantitative criteria and will continue to use the qualitative approach for evaluating whether an activity is legitimate recycling. In addition, the Agency believes that legitimate recycling may occur for reasons other than to recover metal values— recovery of acids, cyanide, or water, for example. With no quantitative tests for such recycling, the Agency believes the qualitative criteria best cover the broad array of situations being addressed. Situations most likely to be deemed sham recycling would, thus, be those involving low amounts of recoverable material plus the presence of non-contributing hazardous constituents in the waste (particularly hazardous constituents not otherwise present in the normal feedstock of the process). See generally, 53 FR at 522(January 8, 1988).

b. Design and Construction Standards. In the January 1996 proposal, the Agency assumed that land-based storage of mineral processing secondary materials was a necessity within the mineral processing sector, and proposed three different types of conditional mechanisms whereby these land-based units could be deemed ''process units'' that would be excluded from Subtitle C jurisdiction. 62 FR at 2345–48. More specifically, these alternative conditions were an environmental performance standard, a design and operating standard, or an ad hoc, site-specific standard developed by an EPA Region or authorized State. The environmental performance standard would have used a ground water protection standard as a determinant of whether a land-based unit was involved in discard. If ground water monitoring determined that there was an exceedance of the MCL (background levels if background exceeded the MCL) at a designated point of compliance, then the unit would be required to implement unit-specific corrective action. 62 FR at 2345–46.

The Agency also proposed, in lieu of compliance with the ground water standard, design and construction standards. EPA proposed that surface impoundments be constructed with a transmissivity equivalent to a 40 mil geomembrane liner placed on top of 12 inches of a material with a 10–5 hydraulic conductivity. Piles could be constructed on concrete, asphalt, or soil any of which would have to have the equivalent transmissivity of three feet of clay with 10–7 cm/sec hydraulic conductivity. *Id.* at 2346.

The final alternative allowed for an authorized State or EPA Region to make a site-specific determination that the unit can be operated in a manner that is protective. The Agency proposed this option to allow for flexibility because there are a range of site-specific characteristics, such as depth to groundwater and rainfall, which can affect the design of a unit and affect the risks posed by such units. *Id.* at 2347.

EPA finds now, however, that the premise of volumetric necessity was mistaken (see the earlier section of this preamble). As such, the Agency is adopting its traditional jurisdictional demarcation point of not allowing exclusions for land-based storage units. As discussed earlier, land-based storage units are so fraught with indicia of discard—including elements of outright disposal via both air and groundwater exposure pathways (borne out by damage cases as well), plus no longer being part of the actual production operation—that EPA views this demarcation as strongly justified once it is clear that there is no necessity to use such units. The sole exception in the final rule which allows for conditional exclusion for a land-based storage unit is for piles resting on pads which are approved by an authorized State or EPA Region, as discussed in the section below.

c. Units Eligible for Conditional Exclusion and Conditions Attached to Such Units. (i) Tanks, Containers and Buildings. Today's rule states that mineral processing secondary materials reclaimed within the industry can be excluded if they are stored in any of the following: tanks, containers, buildings, or piles resting on pads when such piles are evaluated and approved on a site-specific basis by an authorized State or EPA Region. (As noted in the May 12, 1997 proposal, this is conceptually the same as the rule EPA proposed for the oil-bearing secondary materials generated by and recycled within the petroleum industry. See 62 FR at 26048 (May 12, 1997) and 60 FR 57753 (November 20, 1995)). Tanks, containers, building, and approved pads do not have to meet the design and operating standards for units storing RCRA Subtitle C wastes.

EPA also is adopting certain minimal conditions on these units' design to assure basic unit integrity and so assure that tanks, containers, and buildings do not serve as conduits for massive material release (i.e. disposal units). An acceptable tank must be free standing and not be a surface impoundment, and be manufactured of a material suitable for containment of its contents. An acceptable container must be free standing and be manufactured of a material suitable for containment of its contents. An acceptable building must be a man-made structure and have floors constructed from non-earthen materials, have walls, and have a roof suitable for diverting rainwater away from the foundation. A building may also have doors or removable sections to enable trucks or machines access. The Agency's technical report *Non-RCRA Tanks, Containers, and Buildings,* U.S. EPA, 1998, provides examples of acceptable units for the storage of mineral processing secondary materials.

EPA disagrees with comments from public interest groups stating that nothing short of RCRA Subtitle C standards could assure protectiveness and so demonstrate that these non-land-based storage units were not part of the waste management problem. The plenary conditions urged by the public interest group commenters are indeed those necessary for protective management of hazardous wastes, but the Agency's task here is different. It is to delineate discard from non-discard (i.e. wastes from non-wastes), and, as noted at proposal, not only is this a different test than determining protective waste management conditions, but there are jurisdictional constraints on the types of conditions EPA can impose when considering the situation presented here, i.e., secondary materials generated and reclaimed within a single industry sector. 62 FR at 2342. Thus, the conditions EPA is adopting are designed to assure that these units are not essentially sieves functioning as means of disposal.

The Agency discussed its definition of non-RCRA tanks, containers and buildings in its Technical Background Document (See 62 FR at 26050, *Non-RCRA Tanks Containers, and Buildings,* 1997). *Industry* commenters requested clarification on whether their smelter or refiner buildings would meet the definition of ''building'' if tanks, containers or buildings were required. As set out in the final rule, a building is a structure with four walls, a roof, and floor constructed of non-earthen materials. Smelter and refinery buildings are quite large and include floor areas which, in part, use earthen materials. As long as mineral processing secondary materials (i.e. those sludges, by-products, and spent materials which would otherwise be identified as hazardous wastes) are stored in those sections of the smelter and refinery building that do have floors constructed of non-earthen materials, these structures would qualify for the exclusion included in today's rule as non-RCRA buildings.

Industry commenters also noted that the Agency made reference to tanks and containers having to meet applicable industry standards for their construction and operation, such as those established by the American Society of Testing Materials (ASTM) or the American Petroleum Institute (API)(See 62 FR at 26050). They pointed out that API standards deal specifically with tanks, while ASTM standards relate more specifically to testing procedures. The commenters argued that units storing mineral processing secondary materials do not need to comply with these standards to be safe. The Agency agrees that the references to applicable industry standards such as ASTM and API were overly broad and has not included them in today's rule. Industry commenters requested clarification on whether tanks and containers needed covers to meet the condition of ''no land placement.'' The Agency expects that the storage of mineral processing secondary materials will prevent uncontrolled fugitive emissions. Tanks and containers do not need covers as long as the materials stored in them are managed to reduce fugitive emissions. The facility operator will therefore need to determine if covers are needed to effectively control fugitive emissions. For example, tanks and containers placed inside buildings may not need covers.

The gold and copper industries stated that their secondary materials would meet legitimacy conditions and that they do not need to store these materials prior to placement back onto gold heap leaches or copper dump leaches. The final rule indicates that process units, as opposed to storage units, are excluded from RCRA Subtitle C. EPA believes that the heap and dump leach units are process units, notwithstanding the fact that they are land-based. This is because dump and heap leach piles simultaneously produce products and waste. The issue is also academic with respect to these units. This is because the Agency determined that these units are extraction/beneficiation activities in 1986 and reiterated that position in 1989 (see 51 FR 24496 and 54 FR 36592), and their Bevill regulatory status is unchanged by today's rule. Thus, if the heap leach pile becomes a disposal unit because wastes remain there permanently, those wastes presently have Bevill status. The Agency continues to be concerned that there may be environmental risks related to dump and heap leaching, but has determined that this rule is not the appropriate means to address those concerns.

Industry commenters also raised concern that under the ''no land placement'' option, described in the May 1997 proposal, they would no longer be able to place slags on the ground. This is an incorrect reading of the regulations and the proposals since at 40 CFR 261.4(b)(7), iron and steel, copper, lead, zinc, and elemental phosphorus slags are all classified as Bevill exempt mineral processing wastes and would not be affected by this rule. The management of these slags on the ground can continue as long as they meet other applicable federal and state regulations.

(ii) Solid Mineral Processing Secondary Materials Resting On Pads. As noted, EPA proposed at 61 FR 2346 to allow land-based units which had been approved as protective on a site-specific basis by an authorized State or EPA Region. The Agency is retaining a portion of that proposal in the final rule in order to allow solid mineral processing secondary materials resting on pads to be used for storage of mineral processing secondary materials being reclaimed within the industry. The Agency defines ''solid mineral processing secondary materials'' as those mineral processing secondary materials containing no free liquids. The provision functions effectively as a variance to allow conditionally excluded storage using pads to occur.

Industry comments pointed out that there are materials which can be placed on concrete or asphalt pads in a manner that provides the equivalent protection of a tank, container, or building. The Agency is aware that in the arid Southwest, the copper industry places materials on pads to dry them prior to their reentry into processes. The Agency agrees with industry comments that a degree of flexibility is needed regarding the storage of solid mineral processing secondary materials in this sector, particularly given the number of such storage units presently used in arid conditions, and (to a lesser degree of importance) given the number of existing piles used by this industry which conceivably could be upgraded to operate protectively and for which a more flexible approach could be warranted.[12]

In today's rule EPA is adopting a provision whereby persons storing only solid mineral processing secondary materials (those mineral processing secondary materials containing no free liquids) on pads prior to legitimate reclamation in a mineral processing process may seek a determination from an authorized State or (if the pile is located in an unauthorized State) EPA Region such that the unit is approved as protective and materials stored in the unit are conditionally excluded from the regulatory definition of solid waste provided that the pad is not serving as a mode of discard.

Minimum design criteria for pads are as follows; (1) Pads must be designed of non-earthen materials which are compatible with the chemical nature of the mineral processing secondary material being stored, (2) Pads must be capable of withstanding physical stresses associated with placement and removal, (3) Pads must have run on/ runoff controls, (4) Pads must be operated in a manner which controls fugitive dust, and (5) Owner/operators must conduct inspections and maintenance programs to ensure the integrity of the pads.

The decision-maker would evaluate the application for storage on pads against a general environmental performance standard: whether the pad is located, designed, constructed and operated so as to be protective of human health and the environment and is not used for disposal. A broad benchmark of performance would be that the approved pad must afford the same degree of protectiveness as non-RCRA tanks, containers and buildings eligible for exclusion.

The decision-maker would have to consider potential releases via groundwater, surface water, and air exposure pathways. Factors to be considered for assessing the groundwater, surface water, air exposure pathways are:

—The volume and physical and chemical properties of the secondary material, including its potential for migration off the pad;

—The potential for human or environmental exposure to hazardous constituents migrating from the pad via each exposure pathway, and the possibility and extent of harm to human and environmental receptors via each exposure pathway.[13]

Thus, under this regime, a State could approve placement of solid mineral processing secondary materials (those materials containing no free liquids) on a pad where, after consideration of relevant exposure pathways, a determination is made that the mode of storage will not adversely affect human health and the environment, and where the operator has demonstrated compliance with the minimum design and operating criteria. Approval would be more problematic if a pad was located in an area which experiences flooding, or in an area where ground water was close to the surface and used for drinking water purposes.

The Agency is confident that site-specific determinations can be accomplished as part of existing State regulatory programs. The situations eligible for this variance are considerably more circumscribed than at proposal, and the decision criteria consequently more focused, meeting some of the objections in comments from public interest groups on the proposals. Today's rule only allows the placement of mineral processing secondary materials that are physical solids, and the rule also specifies certain minimum conditions such pads must meet to be approved. Further, the rule identifies the factors a State must consider prior to making such determinations. The Agency will review a State's regulatory authorities it intends to use in implementing this determination to assure that an authorized state can effectively implement this element of the rule.

As proposed, EPA is requiring that there be opportunity for public participation in the evaluation and approval process of pads storing solid mineral processing secondary materials. 62 FR at 2366. The Agency believes it is important that those citizens who may be directly affected by these determinations be notified of them and

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[12] EPA has not provided for this type of site-specific approval of land-based storage units in other rules providing for conditioned exclusion from the regulatory definition of solid waste. In some cases, this is because management of solids was not at issue (proposed petroleum listing rule and rules on recovered oil), or the industry sector did not use piles for solids management (steel industry coke-byproducts listing rule). As noted in the text above, EPA believes that there are certain factors peculiar to the mineral processing industry that have persuaded EPA to allow for a site-specific authorization process, but this provision should not be considered to be a precedent for any other industry sector.

[13] As proposed, these general decision factors are drawn from the environmental performance standard in the row-revoked 40 CFR 267.10.62 FR at 2347. Commenters noted correctly that Part 267 is no longer codified, so that these requirements should not be placed in regulatory language (or preamble) by means of a cross-reference to the revoked provisions.

participate in the process, and notes further that this requirement is fully consistent with RCRA's strong preference for public participation. See RCRA section 7004(b).

On the other hand, EPA is not adopting any site-specific approval process for storage of mineral processing secondary materials in surface impoundments. The Agency has concluded that storage in impoundments would likely lead to their contributing to the waste management problem. Many damage incidents in this industry involve the use of impoundments (see damage case on phosphorus impoundments in Idaho). Furthermore, the Agency has determined that there are no engineering or economic constraints on requiring liquid mineral processing secondary materials to be placed in tanks.

d. Speculative Accumulation. In this rule, the Agency is establishing a condition that mineral processing secondary materials cannot be accumulated speculatively as defined in 40 CFR 261.1(c)(8). EPA proposed this condition, 61 FR at 2372, and indeed, this condition already applies to every other secondary material being recycled which is excluded from being a solid waste. See, e.g., 261.2 (e). Industry comments noted that the 12-month limit on speculative accumulation was overly restrictive and that many mineral processing secondary materials need to be stored until economic conditions warrant their recycling. The Agency rejects these comments because no data were presented that would indicate that the volumes of materials being generated could not be efficiently recycled within a 12-month period. In the 12 years the speculative accumulation provision has been in effect, the Agency is unaware of other industries suffering economic burdens by complying with the limits placed on speculative accumulation. Nor is EPA aware of any mineral processing facility which has applied, pursuant to the variance provision in 40 CFR 260.30(a) and 260.31(a) (which allow an extension of the 12-month speculative accumulation period), to extend the existing 12-month requirement for currently excluded mineral processing secondary materials (like unlisted sludges and by-products). The Agency infers that the existing 12-month requirement is not imposing any type of significant constraint on this industry.

e. One Time Notification. EPA proposed that mineral processing plants generating mineral processing secondary materials and utilizing the conditional exclusion to the definition of solid waste provide EPA (or an authorized State) with a one-time notification which describes the mineral processing materials to be recycled and the recycling processes being used. (See 61 FR at 2345). The Agency is finalizing this provision in today's rule. It applies to any facility utilizing the conditional exclusion.

Today's rule requires that the one time notification must specify the types and amounts of mineral processing secondary materials to be recycled and the location and type of unit storing mineral processing secondary material. The notice should be submitted to the appropriate EPA regional office or authorized State. An amended notification would not be required unless the facility has significant process changes affecting the generation, location, or recovery of mineral processing secondary materials.

The reason the provision is needed is to assure that the conditioned-exclusion approach in today's rule can be feasibly implemented. To do so, EPA or States must know what secondary materials are being stored, and where storage is occurring, in order to determine whether the other conditions in the rule are being satisfied. As described above, these other conditions are necessary to assure that secondary material storage within the industry does not become part of the waste management problem. In this very real sense, the notification condition is likewise necessary to assure that the storage is not part of the waste management problem, since notification is necessary to successfully implement the other conditions.

Industry comments opposed this condition, not so much on grounds of unreasonable burden, but based on the argument that the Agency lacks legal authority over non-waste activities. Since EPA finds that the notification condition is an integral part of a group of conditions necessary to assure that storage of these hazardous secondary materials does not become part of the waste management problem, EPA has legal authority to adopt it. In addition, the Agency notes that RCRA section 3007(a) provides authority to enter facilities and obtain information needed to assist in the enforcing of provisions of Subtitle C. This provision can reasonably be read to apply to gathering information to determine whether or not a particular hazardous secondary material is a waste. The notification condition obtains this same type of information by regulatory condition. The Agency thus believes that section 3007(a) (implemented here by rule, pursuant to the Agency's general rulemaking authority under RCRA section 2002(a)) likewise provides authority to adopt this condition.

In the January 1996 proposal, the Agency solicited comment on whether a Facility Operating Plan should be required for facilities that generate, store, or process hazardous mineral processing secondary materials. (See 61 FR at 2345) Under this approach, a Facility Operating Plan would include: a spill prevention plan and procedures; types, quantities, and analysis of recycled materials; product specifications; speculative accumulation and storage requirements; closure plan; and record keeping and reporting for off-site shipments. In today's rule, the Agency is not requiring the preparation of such a plan. This requirement is not necessary given the burden of proof under existing 40 CFR section 261.2(f) that a facility must meet to comply with the conditions of legitimacy, containment, and speculative accumulation. The Agency does, however, strongly encourage facilities to develop a plan or at least components of a plan as part of responsible environmental management.

5. Bevill Related Issues

a. Uniquely Associated. Under the Agency's longstanding interpretation of the Act, the Bevill amendment applies to special wastes that are uniquely associated with extraction/beneficiation and certain mineral processing activities. Because the decision whether a particular waste is uniquely associated may determine whether a particular waste is subject to Subtitle C controls, the Agency believed that it was important and useful to receive public input regarding the manner in which EPA and authorized States apply this principle and solicited comment regarding the criterion for determining whether a waste is uniquely associated with mineral operations. The Agency has described non-uniquely associated wastes at 45 FR 76619, November 19, 1980 and 54 FR 36623, September 1, 1989. In the May 1997 proposal, the Agency noted examples of non-uniquely associated wastes, which include spent solvents, pesticide wastes, and discarded commercial chemicals. As stated in the May 1997 proposal, in the Agency's view, these wastes are logically viewed as not being ''from'' extraction, beneficiation, or mineral processing, and, therefore, are not subject to the Bevill exclusion. (See 62 FR 26054–56, May 12, 1997).

In May 1997, the Agency proposed several alternative approaches to determining whether a waste was uniquely associated. One option to determine if a waste is uniquely associated was the simple application of the high volume threshold used in the Agency's 1989 rulemaking. Under this option, the volume criterion would obviate the need to consider the uniquely associated principle further.

The Agency based this option on the fact that Congress and the courts have established that only large volume special wastes should be eligible for the Bevill exclusion (62 FR 26041, May 12, 1991; *Environmental Defense Fund* v. *EPA*, 852 F.2d 1316 (D.C. Cir 1988), *cert. denied* 489 U.S. 1011, *Solite Corporation* v. *EPA*, 952 F.2d 473, 494–495 (D.C. Cir 1991)). The Agency reasoned that a large volume criterion is simple to apply and is consistent with the broad parameters of Congressional intent. Further, this approach would help prevent additional toxic constituents from being disposed with Bevill wastes, potentially encouraging recycling, and may result in reduction of cleanup costs.

Industry commenters voiced strong opposition to the use of a volume criterion to determine whether a waste was uniquely associated. Commenters stated that the Bevill exclusion was intended to exempt all mining wastes, regardless of their volume or toxicity. As the regulatory history of EPA's implementation of the Bevill exemption makes clear, however, this is not the case. (see 54 FR 36592, September 1, 1989).

Nonetheless, while the Agency has used volume to make certain Bevill determinations, it has not in the past used the high volume criterion to make uniquely associated determinations. The Agency assessed the impact of applying a high volume criteria in making uniquely associated determinations and found that such an application would make virtually all such wastes non-uniquely associated and subject to Subtitle C controls, regardless of the extent to which the waste was, in fact, associated with mining and mineral processing. EPA does not believe that it would be appropriate to ignore altogether the extent to which a particular waste is associated with mining and mineral processing activities that are subject to the Bevill exclusion, since that exclusion on its face applies to wastes *from* those processes. In addition, the Agency believes that a certain degree of flexibility is needed for making uniquely associated determinations due to the complex and varied mineral operations and site-specific factors that must be considered in making these decisions. In today's rule, the Agency is, therefore, not adopting the use of a volume criterion to determine whether a waste is uniquely associated.

The Agency also proposed an option where a waste would be uniquely associated if it came into direct contact with an ore or mineral or wastes from the extraction, beneficiation, or processing of ores and minerals. Several commenters expressed the view that, while contact can be one useful indicator of whether a waste is uniquely associated with mining, such contact should not be required in all cases. These commenters believed that the test should be whether the conduct of mining and mineral processing necessitates the generation of a particular waste; if so, then the waste should be considered uniquely associated. Other commenters believed that the ''contact'' principle was potentially overly broad, since it would have the potential to sweep into Bevill wastes that typically would not be considered uniquely associated. As proposed, however, the contact option would consider only contact that occurred as part of a processing operation.

After consideration of public comments, the Agency has concluded that a strict application of the ''contact'' principle, while appealing because of its simplicity, would not provide the best means of determining whether a waste is uniquely associated with mining or mineral processing. The Agency is concerned that, while contact may be one indicator of when a waste is associated with the mineral recovery process where, for example, the contact with the process imparts chemical characteristics to the waste, EPA agrees with commenters that simple application of the contact principle has the potential to be over-inclusive of wastes that are properly viewed as ''uniquely associated.'' The Agency has not, therefore, adopted that criterion as being determinative of whether a waste is uniquely associated.

The other option in the May 1997 proposal would modify the contact principle to exclude, as non-uniquely associated, wastes that only exhibit the same hazardous characteristic both before and after contact with the Bevill waste, feedstock, or product. This ''modified contact'' approach may reduce the potential for Bevill wastes to be dumping grounds for non-Bevill hazardous wastes. Under this approach, wastes that are inherently hazardous prior to contact with a Bevill waste, and which retain the same hazardous characteristic after contact, would be subject to Subtitle C regulation when discarded.

Commenters pointed out that the Agency had never before proposed to use the hazardous characteristic to determine whether a waste was uniquely associated, nor had the Agency used this criterion in making uniquely associated determinations since 1980. They also pointed out that the Agency had already studied the hazardous characteristics of uniquely associated wastes but nevertheless stated that these wastes should not be subject to RCRA Subtitle C (51 FR 24496).

Some commenters also contended that the real issue is whether the waste is indigenous to the mining and mineral recovery process—i.e., whether it is necessary to generate the waste in order to conduct the process—and that the hazardousness of a material prior to its use in the process is, therefore, irrelevant.

EPA agrees, in part, with these commenters that the characteristics of a material (i.e., whether it is hazardous) prior to use in mineral recovery processes should not be solely determinative of whether the wastes are ''uniquely associated.'' As a general matter, the closer the nexus between a particular waste and the mineral recovery process, the more likely it is ''uniquely associated'' within the meaning of Bevill. The Agency recognizes, however, that one fact that might help evaluate the relationship between a particular waste and the mineral recovery process is the extent to which the properties of a particular waste can be attributed to the process itself. Thus, while the Agency does not believe that hazardousness of a material prior to use in the mineral recovery process should be determinative of its Bevill status after use, the extent to which the material has acquired attributes through its involvement in that process is relevant.

Based on consideration of all the public comments, the Agency believes that it is appropriate to evaluate whether a particular waste is uniquely associated with mining and mineral processing as follows. First, any waste from ancillary operations are not ''uniquely associated'' because they are not properly viewed as being ''from'' mining or mineral processing. In evaluating wastes from non-ancillary operations, one must consider the extent to which the waste originates or derives from processes that serve to remove mineral values from the ground, concentrate or otherwise enhance their characteristics or remove impurities, and the extent to which the mineral recovery process imparts its chemical characteristics to the waste. Under this test, the greater the extent to which the waste results from the mineral recovery process itself, and the more the process imparts to the waste its chemical characteristics, the more likely the waste is ''uniquely associated.''

The Agency believes that this approach provides a reasonable basis to determine whether a waste is ''uniquely associated.'' The Agency believes that these factors touch on the full range of facts that are likely to be relevant in any particular case. As is evident from the criteria summarized above, judgment must be exercised where the question is whether a waste from a non-ancillary operation is uniquely associated. EPA believes that this is appropriate because of the fact-specific nature of this determination and the myriad circumstances that can arise. However, as noted above, the Agency believes that wastes generated from ancillary operations (such as truck maintenance shops at a mine and not from the mining or mineral recovery process itself), are not uniquely associated. Such circumstances would likely present the most readily identifiable cases of non-uniquely associated wastes.

The approach noted above reflects the longstanding principle, based on the clear language in Section 3001 of RCRA, that uniquely associated wastes must result from mining and mineral processes themselves. This approach also is generally consistent with industry's underlying contention that the uniquely associated concept should exempt wastes that are ''indigenous'' to mining. EPA disagrees, however, with industry's contention that uniquely associated wastes are any wastes that are unavoidably generated by mining operations. For example, arguably, it is unavoidably necessary to conduct maintenance on machinery that supports mining at a site (e.g., used to transport ores and minerals among processes); however, such maintenance is not necessarily part of the mining or mineral recovery process itself. EPA believes that the proper focus should be the extent to which a waste is generated as part of the mining and mineral recovery process, not the extent to which a facility must conduct an activity as part of its operation.

The elements of the ''contact'' options discussed in the preamble to the proposal, as well as regulatory language contained in the May 1997 proposed rule (see proposed 40 CFR 261.4(b)(7) (stating that exempt extraction and beneficiation wastes must ''originate from the extracted ore or mineral'')) may affect uniquely associated determinations. While, as discussed above, the Agency believes that sole reliance on a contact principle would be unjustifiably rigid, consideration of the extent to which the mineral recovery imparts to the waste its chemical characteristics provides a useful means of evaluating whether a waste is uniquely associated. The greater the extent to which the waste acquires its chemical characteristics from the process from the processing of an ore or mineral, the more likely that waste would be uniquely associated with the Bevill process. Conversely, the less a particular waste originated from or acquired its characteristics from such processes, the less likely it is uniquely associated.

Some commenters asserted that the Agency's proposal represented a sharp departure from past Agency practice under the uniquely associated principle and would constitute, in effect, a revision of prior Bevill regulatory determinations. Neither contention is correct. While the Agency has articulated here its approach to the uniquely associated principle in more detail than previously, the Agency believes that the approach is fundamentally the same as how the Agency has applied the uniquely associated principle in the past. Second, the Agency is not, through the uniquely associated principle, seeking to revise past regulatory determinations that exempted extraction and beneficiation wastes and certain mineral processing wastes from Subtitle C regulation. The list of exempt extraction/beneficiation processes and mineral processing wastes in section 261.4(b)(7) is not altered by this approach. Even under these existing regulatory provisions, it was necessary to determine in certain cases whether a particular waste stream was, in fact, ''from'' (i.e., ''uniquely associated'' with) one of the enumerated Bevill processes. EPA's past regulatory determinations did not, therefore, obviate the need for determining the applicability of Bevill to particular waste streams. In this rule, EPA is simply ensuring that the uniquely associated criteria have the benefit of full public notice and comment; we have not, however, altered the scope of prior regulatory determinations through this process.

Industry commenters nonetheless had concerns about certain applications of the uniquely associated principle articulated in the mineral processing identification document contained in the docket at proposal. In particular, commenters expressed concerns that the document concluded that spent kerosene in copper solvent extraction, crud from electrowinning, crucibles and cupels, and acid cleaning solutions from gold heap leaches are not uniquely associated. All of the wastes just noted are generated as a result of beneficiation. It should be noted that all wastes generated after the commencement of mineral processing are mineral processing wastes. As a result of the Agency's 1989 rule (54 FR 2322), all mineral processing wastes, except those noted in 40 CFR 261.4(b)(7), are subject to RCRA Subtitle C, if they exhibit a hazardous characteristic. Therefore, the effect of the uniquely associated principle is of less import than at beneficiation facilities.

The Agency received numerous comments challenging the Agency's position that these wastes were not uniquely associated. Comments from the copper industry noted that slimes/muds, crud, and spent kerosene generated from copper solvent extraction and electrowinning were uniquely associated because these wastes had been determined by the Agency in 1989 (see 54 FR 36592) to be wastes from extraction and beneficiation. Based on these comments, the Agency has reassessed its prior conclusions regarding these wastes and agrees with the copper industry that slimes/muds, crud, and spent kerosene generated from copper solvent extraction and electrowinning are uniquely associated. 40 CFR 261.4 states that wastes from solvent extraction and electrowinning are extraction/beneficiation wastes and are not subject to regulation under Subtitle C. Applying the approach described above, it is clear that solvent extraction and electrowinning are clearly not ancillary activities since their sole purpose is to concentrate copper values out of pregnant leach solution. The ''uniquely associated'' nature of these wastes is also supported by the degree to which the wastes originate and derive from the mineral recovery process. Thus, the Agency's view is that these wastes are ''uniquely associated'' with beneficiation.

Comments received from the gold industry noted that acid wash solutions are generated solely from processes used to concentrate gold values from cyanide leach solutions. Again, the Agency has reassessed its earlier interpretation and now believes that acid wash solutions from gold heap leaching are uniquely associated. The Agency came to this conclusion in light of the non-ancillary nature of the process generating these wastes (carbon columns must be kept ''clean'' for the gold to be effectively recovered), the extent to which the wastes originate and derive from this mineral recovery process, as well as the fact that the process imparts some chemical characteristics to the waste (i.e., the ore material that is cleaned from the carbon).

Based on the approach articulated above, the Agency now believes that other wastes are best viewed as non-uniquely associated. For example, the Agency believes that lead anodes used in the electrowinning process are not non-uniquely associated wastes. While lead anodes are used in the mineral recovery process and thus could be viewed as uniquely associated based on this consideration in isolation, a countervailing consideration is that the mineral recovery process imparts virtually no characteristics to these materials. Lead anodes are virtually identical both before and after being used in the process. On balance, the Agency concludes that lead anodes are not uniquely associated with mining and mineral processing.

The Agency also reassessed the status of cupels and crucibles and finds that they remain non-uniquely associated wastes. These wastes are the result of laboratory testing. Cupels and crucibles are also used in other industries (e.g., jewelry companies test the precious metal content of metals using cupels). These wastes are from an ancillary operation, laboratory analyses, and are not generated due to the direct recovery of gold and, therefore, fail to meet the Agency's uniquely associated criteria. It should also be noted that the Agency has consistently found that laboratory wastes are generally non-uniquely associated.

As stated previously, the applications of the ''uniquely associated'' principle articulated here reflect the Agency's interpretation of the criteria as applied to those particular wastes based on the best current information available to EPA. Like the positions articulated in the Identification Document, these calls represent the Agency's current best evaluation of whether these wastes are ''uniquely associated,'' based on available information. However, the discussion above and in the Identification Document simply provides guidance on these issues, and therefore, the determinations are not legally binding on decisionmakers, the public, or the courts.

Finally, one commenter argued that the uniquely associated principle as discussed by EPA is an impermissible reading of the Act to the extent it would authorize EPA to consider factors other than high volume/low toxicity in making Bevill determinations. The Agency disagrees with this position. The Court in *EDF II* directed the Agency to apply a high volume/low toxicity criteria to determine if a mineral processing waste would retain the Bevill exclusion. The uniquely associated inquiry is somewhat different. The question here is the threshold issue whether a particular waste is ''from'' extraction, beneficiation or mineral processing in the first place. The Agency does not believe that the decision in *EDF II* spoke to that inquiry. Rather, *EDF II* was concerned solely with the circumstances under which a waste that is ''from'' these processes qualifies for the Bevill exclusion. Stated another way, a waste is only subject to the Bevill exclusion if it is, in fact, ''uniquely associated'' with extraction/beneficiation or one of the 20 exempt mineral processing wastes. Thus, the uniquely associated principle does not expand the scope of the Bevill exemption, and the Agency's approach is, therefore, entirely consistent with the decision in *EDF II.*

b. Addition of Mineral Processing Secondary Materials to Units Processing Bevill Raw Materials. The question addressed in this section is: if a Bevill extraction/beneficiation process uses as feedstock a mineral processing secondary material which otherwise would be a hazardous waste, would the resulting wastes still be considered to be from extraction/beneficiation and hence Bevill exempt?

There are two bases for potential environmental concern prompting this question. The narrower issue is that if otherwise-hazardous wastes are used as partial feedstocks, could they change the resulting wastes' character in a manner such that the existing exclusion should no longer apply, or, put another way, is the Bevill exemption being used to shield disposal of non-exempt hazardous wastes? The broader issue is whether the Bevill amendment, which creates an exemption from rules designed to protect the public and the environment from unsafe hazardous waste disposal practices, should be interpreted any more broadly than necessary given that the effect is to exempt more waste from protective controls.

EPA proposed two different answers to these questions. In the January 1996 proposal, the Agency proposed to apply the same ''significantly affected'' test used in the partially analogous context of a Bevill device which co-processes hazardous waste along with normal raw material feedstock. 61 FR at 2351 and 40 CFR section 266.112. So long as resulting wastes from the extraction/beneficiation process were not ''significantly affected'' by the addition of hazardous secondary materials, resulting wastes would remain exempt. Id. Significantly affected meant either that the resulting wastes reflecting co-processing were statistically different over the non-waste baseline, or that there was an environmentally significant increase in hazardous constituents over the non-waste baseline. Id.

The May 1997 proposal would have gone further and interpreted the Bevill amendment narrowly (a common rule of construction when construing exceptions to plenary protective regulatory schemes to apply only to situations when extraction/beneficiation raw material feedstocks are utilized) to apply only to situations when extraction/beneficiation raw material feedstocks are utilized (see 62 FR at 26052).

After reviewing the public comments, the Agency has decided not to adopt either of these alternatives. As explained below, EPA ultimately has decided that the likely result of either proposal would be unwarranted disruption to legitimate (and desirable) recovery practices within the industry. Nonetheless, as discussed in the final subsection of this part of the preamble, the Agency retains concerns that the Bevill amendment not be used as a means of shielding disposal of non-Bevill hazardous wastes, and therefore cautions that the Agency intends to scrutinize especially carefully claims of legitimate recycling when hazardous secondary materials are co-processed in extraction/beneficiation operations.

(i) Should the Bevill amendment apply only when virgin materials are processed in extraction/beneficiation operations? In the Agency's May 1997 proposal, EPA sought comment on whether a narrow reading of the Bevill exclusion should be implemented which would limit the availability of the Bevill exemption to wastes generated exclusively from the use of Bevill raw materials, namely ores and minerals. Under this approach only virgin ores used as a feedstock to a beneficiation operation and only concentrates derived from beneficiation and then used as a feedstock to mineral processing would be eligible for the Bevill exclusion. If any alternative materials were used as feedstocks, the resulting waste would not be eligible for the Bevill exclusion. 62 FR at 26052.

In today's rule, the Agency is declining to pursue this option. Industry comments were uniformly opposed. Industry noted that since 1989, the Agency has established a clear use of the 50 percent rule and was well aware that the co-processing of a range of materials was occurring at both extraction/beneficiation and mineral processing facilities when it finalized its

1989 rulemaking (see 54 FR 33620, September 1, 1989). Industry further pointed out that in the 1989 rulemaking the Agency found that 20 mineral processing wastes (see 40 CFR 261.4(b)(7)) would retain their Bevill exempt status even though co-processing was occurring. Industry also noted that the Agency had not presented any data to confirm that the co-processing of virgin and non-virgin materials would actually increase risks to the environment. Public interest groups on the other hand indicated that the proposed option more closely follows the intent of Congress to limit the Bevill exemption to high volume, low toxicity wastes.

The Agency has reviewed the data on co-processing of non-virgin and virgin material and finds that it did evaluate co-processing issues in its 1990 Report to Congress on Wastes from Mineral Processing (EPA Office of Solid Waste, July 31, 1990). This review, as it relates to the 20 mineral processing waste streams that are still exempt, found that co-processing had not significantly changed the hazardous properties of the resultant wastes.

The Agency noted in its proposal that it was unaware of the extent of co-processing at extraction/beneficiation facilities, particularly after 1985. Industry comments noted that background reports to the Agency's 1985 ''Report to Congress on Extraction and Beneficiation Wastes'' (EPA Office of Solid Waste, December 31, 1985) discussed this co-processing issue. Agency review of these documents indicates that while some references to feedstocks are discussed, the Agency was not aware of the extent of this practice until it began to restudy mining and mineral waste management practices in 1989 and initiated a series of visits to mines and mineral processing facilities in 1991–92.

Industry also submitted comments indicating that implementing this option would have significant adverse impacts on the mining and mineral processing industries. The Agency assessed industry comments and conducted its own economic analysis. The Agency found that implementation of this option may reduce current recycling in the copper and lead sectors, and could cause potentially serious economic disruption to industry. (See EPA's Regulatory Risk Impact Analyses.) Both the gold and copper sectors pointed out that they routinely reintroduce mineral-bearing streams from their processing activities into their beneficiation plants to further recover metal values. Such practices would diminish if this option were implemented, since affected extraction/beneficiation operations would not recycle secondary materials if the result is to lose Bevill status of the resulting wastes. It makes little sense for the Agency to implement a program which may reduce recycling where its knowledge of the environmental benefit of the approach is limited.

(ii) Significantly Affected. Under the Agency's January 1996 proposal, mineral processing secondary materials could be introduced into beneficiation units generating Bevill-exempt wastes (without affecting the wastes' Bevill status) if they were legitimately recycled, secondary materials comprised less than 50% of the total feed to the unit, and the resulting wastes were not ''significantly affected'' by the recycling practice.

EPA has decided to adopt the proposed approach except the Agency has decided not to adopt the proposed ''significantly affected'' test in today's final rule. It should be pointed out that small volumes of mineral processing secondary materials likely to be recycled at beneficiation facilities would be processed along with enormous quantities of raw ore. Therefore, the probability that the introduction of such materials would affect the characteristic of the resultant wastes is very low.

Given the likelihood of minimal environmental effect, the Agency must therefore judge whether the benefits of encouraging recycling these materials outweigh the potential additive risks that, however unlikely, could potentially occur in unusual cases. The Agency has decided that, from both an implementation and an overall environmental perspective, not requiring a ''significantly affected'' evaluation makes sense. While it is possible that adoption of a ''significantly affected'' test might catch the unusual circumstance where addition of secondary materials substantially changes the characteristics of the resultant wastes, imposing such a requirement could potentially have a chilling effect on the amount of secondary material that the industry recycles. This is because industry would not risk imperilling Bevill status, since a consequence could be RCRA permitting and facility-wide corrective action potentially affecting areas of historic contamination. From an environmental perspective, EPA believes that the benefits of recycling such materials are substantial, and far outweigh the largely marginal benefits that could be associated with requiring a ''significantly affected'' analysis on a waste stream by waste stream basis.

EPA originally viewed the situation presented here as analogous to when hazardous wastes are co-processed in Bevill units, and so proposed the identical test for resulting residues. 61 FR at 2351. On reflection, there are important distinctions between the two fact patterns. EPA applies the ''significantly affected'' tests when what are admittedly hazardous wastes are co-processed. The usual case is when a hazardous waste fuel is burned in a Bevill unit (like a cement kiln) which also processes normal raw materials. The hazardous wastes can contribute more and different hazardous constituents not normally found in the raw materials. In the extraction/beneficiation example, however, the mineral processing secondary materials are being used as feedstock precisely because those materials share attributes found in raw materials (i.e., recoverable amounts of metals). Because the rule limits co-processing to mineral processing secondary materials, such materials would typically be similar in nature to the raw materials being processed, making it far less likely that co-processing would significantly alter the attributes of resulting wastes. In addition, unlike the burning in furnaces example noted above, the mineral processing secondary materials being recycled are not hazardous wastes. Although they are secondary materials, the Agency has decided to exclude them from the regulatory definition of solid waste (assuming legitimate recycling) because the activity resembles normal reclamation practices within the industry. Put another way, since the mineral processing secondary materials are from the same industry sector and are being reclaimed within the same industry, they can be viewed as secondary materials which are not wastes. It is, thus, less appropriate to apply a significantly affected test to these non-waste feedstocks.

EPA also was unable to apply the ''significantly affected'' test in a manner that would focus on those secondary materials that actually could cause significantly increased environmental risks. The proposed test was the Burning in Furnaces (BIF) 2-part test, which would function in a different manner in this rule. Under the BIF rule, the concern was with the use of hazardous wastes from outside industries, and residuals rarely fail the second part of the test, exceeding the hazardous characteristic. Here, we are dealing with materials from within the industry, metal values are reclaimed, and wastes typically exhibit a hazardous characteristic. Since mineral processing secondary materials often contain other metals in them, the resultant wastes from co-processing may show statistical increases or decreases in the metals content of the resultant wastes. The increases or decreases in metal constituents, however, does not necessarily mean that risk has increased. An increase in one constituent may be offset by a decrease in another constituent or by additional volumes of raw material feedstocks that would be needed to replace the mineral processing secondary materials. The application of the proposed test therefore could not be effectively used to determine if risks would increase if secondary materials are co-processed at beneficiation facilities.

(iii) Conclusion. For these reasons, the Agency has decided to retain as a condition for retaining Bevill status the standard requirement that an extraction/beneficiation unit processes at least 50 percent raw material. 54 FR at 33620 (Sept. 1, 1989); 50 FR at 49190 (Nov. 25, 1985); and 56 FR at 7198 (Feb. 21, 1991) (previous instances where EPA has used this test); 61 FR at 2351 (proposal of that test here). If the 50 percent criterion is met, the resulting waste would still be from extraction/beneficiation and hence exempt. Raw materials can be mineral processing secondary materials and be placed into units generating Bevill-exempt wastes provided that the facility legitimately recycles these materials.

The proviso is important. EPA repeats that the Bevill amendment is not to serve as a means of disposing of non-Bevill hazardous wastes. As explained later in the preamble, if a hazardous waste is mixed with a Bevill waste, the mixing is regulated under RCRA Subtitle C, and the mixed wastes may be Subtitle C hazardous wastes. While the mixture rule does not apply when materials are placed in a beneficiation unit for legitimate recycling, it would apply if a hazardous secondary material is not being recycled legitimately. See *U.S.* v. *Self*, 2 F.3d at 1071, 1079 (10th Cir. 1993)(sham recycling is simply hazardous waste disposal or treatment).

It should also be pointed out that today's rule prohibits the storage on the ground of any characteristically hazardous mineral processing secondary material. Should a beneficiation facility wish to legitimately reclaim such materials, it should be aware that placement of these materials in raw material piles may change the RCRA status of the pile.

c. Bevill Mixture Rule and Disposal. Disposal of waste mixtures is the focus of this section. The Agency promulgated the Bevill mixture rule in 1989 (see 54 FR 36592). That rule was remanded to the Agency in *Solite Corp* v. *EPA*, 952 F.2d 473, 493–94 (D.C. Cir. 1991). EPA reinstated the mixture rule in 1992; however, this reinstatement was found to be procedurally defective in *Mobil Oil* v. *EPA*, 35 F. 3d 579 (D.C. Cir. 1994).

In the January 1996 proposal, the Agency proposed that if any mineral processing hazardous waste, or indeed any hazardous waste, is mixed with and disposed with a Bevill waste, the resulting waste is, under certain circumstances, regulated under RCRA Subtitle C. The Agency further stated that the mixture of Bevill wastes and hazardous wastes would normally be regulated as a form of treatment subject to regulation under Subtitle C. The Agency stated its concern about the potential human health and environmental risks due to increased hazardous constituents resulting from the disposal of mixtures of hazardous waste with Bevill-exempt wastes. The Agency based the proposal on the policy that Bevill wastes not be allowed to serve as an unregulated dumping ground for hazardous wastes. Cf. *Horsehead Resource Development Co.* v. *Browner*, 16 F. 3d at 1258.

The rule being adopted today is a reinstatement of the mixture rule promulgated in 1989. The Agency continues to believe that the approach adopted in 1989 is sound, and properly balances the objectives of the Bevill amendment with those of RCRA as a whole. While commenters criticized EPA on the grounds that the prior mixture rule has twice been struck down by the courts, those decisions did not address the merits of the Bevill mixture rule.

One clarification of statements in the 1996 proposal is in order. The Agency stated that the proposed rule differed from the 1989 Bevill mixture rule in that the earlier rule had exempted mixtures of Bevill wastes and characteristic hazardous wastes from requirements pertaining to treatment. *See* 61 Fed. Reg. 2352. This statement was, however, in error. The Agency stated in the 1989 rulemaking that such mixing would, in fact, constitute treatment of a hazardous waste, and would be subject to the appropriate regulation for treatment storage and disposal of hazardous wastes, including obtaining a permit. 54 Fed. Reg. 36622. Thus, the Agency is not taking a more stringent approach to regulating mixtures than was taken in 1989. As in 1989, moreover, the Agency is not amending in any way the definition of treatment, storage, or disposal of hazardous wastes; nor is the Agency promulgating any specific provisions related to how those definitions apply to mineral processing wastes. The Agency is simply stating that mixtures of Bevill and non-Bevill wastes can, depending upon the particular facts, constitute treatment, storage or disposal under the existing regulatory program.

Industry commenters generally opposed the proposed mixture rule. Several commenters argued that the proposed rule was contrary to the Act because it undermined the protection that the Bevill amendment was intended to provide the industry. These commenters argued that the legislative history indicates Congress intended the Bevill amendment to be read broadly, to incorporate waste products generated in the ‘‘real world,’’ and that Congress recognized co-management of wastes practiced by the industry occurred in the ‘‘real world.’’ According to these commenters, integrated facilities conducting extraction, beneficiation and processing operations at a single location have historically co-managed wastes from these operations, including certain newly identified mineral processing wastes, and the proposed rule would effectively undermine the protections of the Bevill amendment for these operations. One commenter contended that the mixture rule would subject ‘‘high volume/low hazard’’ waste mixtures from the mining and mineral processing industry to Subtitle C regulation without having conducted the special study and regulatory determination process set forth in section 3001 of RCRA. Since such mixtures of wastes are ‘‘high volume/low hazard,’’ these commenters argued that section 3001, as construed by the Court in *EDF v. EPA*, 852 F.2d 1316 (D.C. Cir. 1988), mandates exclusion of those wastes from regulation under Subtitle C.

After careful consideration of these comments, EPA has concluded that they misconstrue the scope of the Bevill amendment, and that the proposed approach to Bevill mixtures is a reasonable one. First, the Agency disagrees with these commenters' interpretation of the Bevill amendment as applying to not only to ‘‘special wastes’’ themselves, but also to any other hazardous waste that may be co-managed with them. Congress simply provided that ‘‘solid waste from extraction, beneficiation and processing of ores and minerals’’ are not subject to Subtitle C. RCRA § 3001(b)(3)(A). Congress did not, as these commenters suggested, apply this exclusion to such wastes ‘‘and other hazardous wastes that may be co-managed’’ with them. Rather, Congress endorsed EPA's conclusion that high volume/low toxicity ‘‘special wastes’’ deserved special treatment under the Act by virtue of the difficulties that would be associated with managing these wastes under the Subtitle C program. Moreover, EPA's decade-long effort to demarcate the line between special wastes and non-excluded wastes was premised on the notion that the line between them is of some significance. If any hazardous waste can come within the scope of the Bevill amendment simply by being mixed with Bevill waste, that line becomes blurred, potentially creating a universe of excluded wastes far beyond that envisioned by Congress when it enacted the Bevill amendment.

The Court in *EDF II* indicated that those mineral processing wastes which did not meet the high volume/low toxicity criteria should be fully subject to Subtitle C. The Agency, in today's rule, has taken prudent steps to encourage the legitimate recycling of hazardous secondary materials. If hazardous mineral processing wastes can not be recycled and must be disposed, the Agency finds nothing in *EDF II* which precludes the Agency from treating these hazardous wastes like any other hazardous wastes. It should also be pointed out that today's rule does not affect the disposal of extraction/beneficiation wastes as long as there is no mixing of non-exempt hazardous wastes with them. EPA believes that this rule is consistent with the scope of the Bevill amendment because it maintains the Bevill exclusion for mixtures that are hazardous due solely to any hazardous constituents of the Bevill waste. The fact that these resulting wastes retain their Bevill status does not mean, however, that the act of storing, treating, or disposing of hazardous wastes with Bevill wastes should be exempted from normal Subtitle C controls.

EPA also disagrees with the notion advanced by some commenters that EPA is required by section 3001 to conduct a study to determine whether mixtures of Bevill and other wastes meet the high volume/low toxicity test and thereby merit being covered by the Bevill amendment. EPA reads section 3001 as mandating that EPA study wastes generated by the mining and mineral processing industry for purposes of determining whether particular waste streams are subject to the Bevill amendment. EPA has done so and determined that mineral processing wastes that do not meet the high volume/low toxicity threshold are not subject to Bevill. EPA's orderly decision-making (see 54 FR 36592 and 55 FR 2322), would be undermined if the Agency were then required to revisit these determinations based upon how facilities happen to manage their wastes.

Stated another way, EPA reasonably based its Bevill regulatory determinations on the volumes of each type of mineral processing waste *generated* within the industry; the Agency does not believe it is reasonable to interpret section 3001 as mandating that EPA disregard the volumes in which wastes are generated and instead base its determinations on the vagaries of how those waste streams may be aggregated through industry's disposal practices. Such a result would be counter to EPA's special waste concept, and ignore the fact that mineral processing wastes streams that are not generated above Bevill's high volume/low toxicity threshold would, in fact, be amenable to management under Subtitle C. Thus, the commenter's interpretation would effectively allow the mining and mineral processing industry to ''bootstrap'' smaller volume wastes into Bevill simply by co-disposing them with Bevill wastes. The Agency and the courts have never interpreted Bevill in such an awkward fashion, and the Agency declines to follow such an approach here.

The Agency does not agree with comments that any change to the Bevill mixture rule would effectively eliminate Bevill for integrated facilities. Today's rule does not change the Bevill status of extraction/beneficiation wastes nor does it alter the Bevill status of 20 mineral processing wastes (see 40 CFR 261.4). Since a large number of ''newly identified'' mineral processing waste streams become subject to the LDR, the Agency took steps to clarify the status of non-exempt ''Bevill'' wastes (i.e. mineral processing wastes not within the scope of the Bevill amendment) in this rulemaking. The Identification report, placed in the docket in January 1996, was developed by the Agency to assist companies in determining if wastes were or were not exempt. The Agency sought comment on the draft Identification document and has finalized this report. This report is, however, guidance. Mineral processing companies now have the ability to identify the status of each waste stream and to cease mixing non-exempt hazardous wastes with exempt waste streams.

Regarding commenters' critique of the concerns expressed by EPA in the proposal justifying the proposed mixture rule, the Agency continues to be concerned about the mixture of hazardous wastes with Bevill exempt wastes for treatment, storage or disposal. The Agency has noted earlier that it is not imposing the significantly affected option because the mixture of hazardous secondary materials with feedstocks does not appear to adversely affect risk. This is so because the mixtures are destined for legitimate recovery of metal, acid, water or cyanide, or other values. Mixtures destined for disposal will not have any of their hazardous constituents removed or other values utilized and may contribute to the waste disposal problem. Nor is there the slightest indication in law that normal Subtitle C rules should not apply to disposal of normal Subtitle C hazardous wastes.

Commenters did point out several errors made by EPA in the proposed rule language. Many commenters noted that there was an inconsistency between the preamble of the January proposal and its proposed regulatory language. The proposed regulatory language inadvertently omitted language in the general mixture rule stating that mixture of a solid waste with a hazardous wasted listed solely because it exhibits a characteristic identified in Part 261 subpart C is a hazardous waste ''unless the resultant mixture no longer exhibits any characteristic of hazardous waste. . . '' 40 C.F.R. 261.3(a)(2)(iii). It was not EPA's intent to propose deleting this language, and it therefore is included in the final rule.

In addition, as pointed out by commenters, the proposed language failed to track the preamble discussion of mixtures of Bevill wastes and characteristic hazardous wastes (as well as wastes that are listed because they exhibit a hazardous characteristic). Under the proposed rule language, mixtures of Bevill wastes and hazardous wastes would be a hazardous waste whenever it exhibited a hazardous waste characteristic, even where that characteristic was imparted to it solely from the Bevill waste. (See proposed section 261.3(i).) As shown by the preamble, this was clearly not EPA's intent, which was to preserve the Bevill exclusion for mixtures that are hazardous solely because of the Bevill component of the mixture. See 61 FR 2352–53.

Conversely, the preamble, although ambiguous in spots on this issue, did say at one point that mixtures of characteristic hazardous waste and Bevill wastes would be considered hazardous waste only if the mixture continued to be hazardous due to characteristics imparted to it by the non-Bevill waste. 61 FR at 2352. If the mixture exhibited a hazardous characteristic due solely to the Bevill waste, the Agency did not intend to designate the mixture as a hazardous waste.

Consistent with that discussion, under today's rule, the Agency has decided that if Subtitle C hazardous waste exhibiting a characteristic is mixed with Bevill-exempt waste exhibiting the same characteristic and the mixture continues to exhibit that common characteristic, then the entire mixture should be considered to be non-exempt hazardous waste. This result is consistent with normal rules on when wastes are hazardous, which state that if a waste exhibits a hazardous waste characteristic, it remains a hazardous waste unless and until it no longer exhibits a characteristic. 40 CFR 261.3(d)(1). In addition, such a principle will make this rule easier to administer (should this situation actually occur), since enforcement officials will not have to parse out which portion of the waste mixture is imparting the characteristic property. Finally, the result is consistent with the overall object of today's rule: not to let Bevill wastes be used as a means of allowing unregulated management of normal Subtitle C hazardous wastes.

Several commenters noted concern that existing exemptions to the Agency's mixture rule, such as that given to totally enclosed treatment facilities and elementary neutralization units, would be eliminated under this rule. The Agency reiterates that this rule does not alter in any way the current Agency mixture rule. The purpose of this rulemaking is to place the mixing of hazardous wastes that may occur at mineral processing plants on the same status as all other hazardous waste management.

(i) Illustrations of how today's rule operates. Although the regulatory parlance for today's rule has always been the ''Bevill mixture rule'', the greatest practical consequence of the rule is probably on the units where mixing occurs. This is because units (i.e. tanks, impoundments, piles, landfills, etc.) where hazardous wastes are placed will (absent some exemption or exclusion other than that provided by the Bevill amendment) be regulated units, i.e. units subject to Subtitle C standards for treatment, storage, and/or disposal. This point is illustrated by the following examples, which also illustrate the effect of the rule on the resulting mixtures:

Example 1. Facility A generates F 001 listed spent solvents which it mixes with a solid waste that has Bevill exempt-status. The mixing occurs in a landfill.

The landfill is a regulated unit because hazardous waste—F 001—is being disposed in it. (Among other things, this means that the F 001 wastes could not be placed in the landfill until the LDR treatment standard is satisfied.) In addition, all of the wastes with which the F 001 wastes are mixed are hazardous wastes carrying the F 001 waste code by application of the mixture rule.

Example 1a. Same facts as in example 1, except that the waste being mixed is F 003 spent solvent, a waste listed only because it exhibits a characteristic of hazardous waste.

The landfill becomes a regulated unit for the same reason as in example 1. (See *Chemical Waste Management v. EPA,* 976 F.2d at 20 n.4 and 24 n. 10 (placement of waste which is hazardous for any amount of time in a unit subject that unit to Subtitle C regulation); 61 FR at 2352 (same). However, the status of the resulting waste mixture is determined by the principles for characteristic hazardous wastes, illustrated below.

Example 2. Facility B generates a characteristic ignitable solvent which it adds to a surface impoundment containing a Bevill-exempt waste that would exhibit the TC for lead. The resulting mixture exhibits TC for lead but is no longer ignitable.

The surface impoundment is a regulated unit, since it is engaged in treatment (elimination of the ignitability characteristic) and disposal (the placement of the ignitable waste). The remaining wastes in the unit retain their Bevill-exempt status because they do not exhibit the characteristic property of the non-Bevill hazardous waste. Thus, if the waste were to be removed from the impoundment and disposed elsewhere, disposal need not occur in a regulated unit.

Example 3. Facility C generates a characteristic hazardous waste exhibiting TC for lead which it mixes in a tank with Bevill-exempt wastes which also would exhibit the TC for lead. The resulting mixture continues to be TC for lead.

The tank is engaged at least in storage of hazardous waste, and possibly treatment (depending on how the D008 hazardous waste is affected by the mixing). If waste is removed from the tank, it remains subject to Subtitle C because it continues to exhibit the characteristic of the non-exempt hazardous waste.

d. Remining. The Agency clarified in its January 1996 proposal that the removal of historically land placed mineral processing wastes for the purposes of mineral recovery would not constitute disposal for purposes of triggering Subtitle C. Moreover, removal of wastes would not render the historic disposal unit subject to RCRA hazardous waste requirements (see 53 FR at 51444, December 21, 1988). The Agency is today again clarifying that removal of waste from a unit does not constitute disposal for the purposes of triggering Subtitle C regulation.

Commenters noted that the proposed mixture rule would in effect eliminate opportunities for remining. The Agency disagrees. As noted previously, the mixture restrictions in today's rule deals primarily with disposal of mixtures. The mixture rule therefore, will not affect the co-processing of historically disposed mineral processing secondary materials with other feedstocks.

6. Responses to Court Remands

a. Applicability of the Toxicity Characteristic Leaching Procedure (TCLP) to Mineral Processing Wastes. In the January 1996 proposal, the Agency proposed to continue using the TCLP (SW–846 Test Method 1311) as the basis for determining whether mineral processing wastes and manufactured gas plant wastes exhibit the toxicity characteristic (TC) of hazardous wastes, and developed a record supporting this position. When the Agency promulgated the TCLP method for testing whether wastes exhibit the toxicity characteristic, the applicability of the TCLP test to mineral processing wastes was challenged in *Edison Electric Institute* v. *EPA*, 2 F.3d 438 (D.C. Cir. 1993) (''*Edison*''). The Court held that the information in the record at the time was insufficient to show a rational relationship between the TCLP and a likely mismanagement scenario for mineral processing wastes.

Under the Court's holding, the Agency must at least provide some factual support that such a mismanagement scenario is plausible (2 F.3d at 446–47). The Agency is addressing this remand in today's final rule because any applicable land disposal restrictions would have little meaning unless the Agency has a basis for determining whether these mineral processing wastes are hazardous, and, therefore, subject to the restrictions.

Under the Court's ruling in *Edison,* the application of the TCLP test to mineral processing wastes is appropriate if the evidence available to EPA shows that disposal of such wastes in municipal solid waste landfills (MSWLF) is a ''plausible'' mismanagement scenario (not necessarily requiring that it be typical or common) 2 F.3d at 446. Moreover, it is sufficient if there is ''evidence or explanation on the record to justify a conclusion that mineral wastes ever come into contact with any form of acidic leaching medium.'' *Id.* at 447.

In considering the plausibility of this mismanagement scenario, the Agency has first carefully evaluated those circumstances that industry has argued make such mismanagement implausible. Industry has argued that co-disposal with municipal solid waste is not plausible because the huge volumes in which the wastes are generated could simply not be handled by an MSWLF. EPA has, however, conducted a comprehensive review of such wastes and concluded that many wastestreams are generated at low volumes. (See

Characterization of Mining and Mineral Processing Wastestreams, USEPA, 1998.) Thus, the volumes in which mineral processing wastes are generated do not render disposal in an MSWLF implausible.

Industry comments also indicated that the location of its facilities were remote and not close to municipal landfills. Based on physical location alone, industry suggested that disposal of their wastes in municipal landfills was very unlikely. This contention is not, however, supported by the facts. The Agency evaluated the location of mineral processing facilities and found that a considerable number of them are located east of the Mississippi River and some are located in or near urban areas. (see *Population Studies of Mines and Mineral Processing Sites,* 1998, U.S. EPA.) This report indicates that there is factual information which rebuts the industry's position that the location of mineral processing facilities is routinely so remote so as to make co-disposal with municipal solid waste implausible. Thus, based on the Agency's population study noted above, the Agency concludes that some mineral processing facilities are in fact located in or near urban areas and their location in such urban areas means that it is plausible that their wastes could be disposed of in urban landfills.

Factual information collected by the Agency (made available for public comment) supports the conclusion that mineral processing wastes may plausibly be disposed of with municipal solid wastes. Industry comments contested EPA's factual basis for the landfill disposal cases found in *Applicability of the Toxicity Characteristic Leaching Procedure to Mineral Processing Waste,* U.S. EPA, 1998. Industry commenters contended that the cases presented by the Agency do not reflect current waste management practices (which primarily involve on-site disposal). Industry commenters also argued that the facts of particular cases did not, in fact, support the conclusion that co-disposal had occurred. EPA has reviewed the information and concluded some of these comments had merit, and EPA has deleted from the final document those cases for which there was not sufficient information to be relied upon by the Agency. However, even after a careful sifting of the case studies, there continues to be evidence to support the conclusion that co-disposal of mineral processing wastes with municipal solid waste is plausible. While most mineral processing wastes are generated in large volumes and disposed on-site as industry contends, the Agency has found that some mineral processing wastes are placed in dumpsters, or similar containers, and shipped off-site for commercial disposal.

These cases include, but are not limited to, co-disposal of mineral processing wastes from the refining of alumina, copper, gold, ferrous metals, lead, silver, and zinc. Such wastes have been disposed in MSWLFs in various states throughout the United States. The Agency also found several cases where manufactured gas plant wastes were disposed in MSWLFs. (See *Applicability of the Toxicity Characteristic Leaching Procedure to Mineral Processing Waste,* U.S. EPA, 1998.)

EPA acknowledges that the information obtained by the Agency does not show that the mismanagement scenario is either typical or common, but such a level of proof is not required. *Edison,* 2 F.3d at 446. It is, moreover, not surprising that the practice does not appear to be widespread because, since 1989, disposal of any non-Bevill hazardous mineral processing wastes in a municipal solid waste landfill has been illegal. Nonetheless, since some mineral processing facilities are located near urban areas and generate low volume wastes, and some of these facilities appear to have, in fact, co-disposed of these wastes in this manner, EPA believes it is reasonable to conclude that application of its mismanagement scenario to mineral processing wastes is reasonable; that is, if these wastes were no longer identified as hazardous by means of the TCLP, then the type of improper disposal which occurred in the past could resume.

Industry commenters further contend that an alternative test, the Synthetic Precipitation Leaching Procedure (SPLP), is more appropriate for mineral processing wastes. The National Mining Association (NMA) noted in its comments that the leach solution used in the SPLP test protocol would more accurately reflect the environmental exposure of mineral processing wastes. The SPLP test uses a leach solution which mimics acid rain, while the TCLP uses a leach solution which mimics acids formed in municipal landfills. The TCLP test therefore uses a leach solution which is more acidic that the SPLP test. However, ''[n]othing in [RCRA] requires EPA to tailor the TCLP to the conditions to which mineral wastes are typically exposed.'' *Edison,* 2 F.3d at 443. If that were the case, it would not have been appropriate for EPA to even have adopted a generic mismanagement scenario as the basis for establishing its approach for testing for the hazardous characteristic. This approach has, however, been upheld as a reasonable exercise of the Agency's discretion. *Id.*

Industry commenters supplied data indicating that the TCLP is more aggressive than the SPLP for most metals and especially lead. Certain states supported use of the test under all or limited circumstances. EPA received very limited data comparing the leach tests. Because these data were extremely limited, the Agency still does not have data broadly comparing TCLP results to SPLP results for a range of mineral processing waste streams. Industry-supplied data appear to indicate that the SPLP test generates results which show lower levels of lead than comparable results using the TCLP. Thus, due to the limited amount of data, the Agency is unable to determine if the SPLP would routinely show lower levels of lead, or how the two tests compare when analyzing other metals or whether such lower levels would, in fact, better reflect actual field conditions than would the TCLP. At bottom, the fundamental issue is not whether one test is more conservative than the other. Rather, the issue is whether it is plausible that mineral processing wastes may be disposed of in environments reflected by the conditions mimicked in the TCLP.

Aside from the plausibility of the Agency's mismanagement scenario, application of the TCLP to mineral processing wastes is supported by comments from industry submitted during the rulemaking regarding disposal practices that are taking place or advantageous at integrated mineral processing/beneficiation facilities in the industry. The proposed (and now final) rule regarding mixtures of Bevill wastes with non-Bevill hazardous wastes (including mineral processing hazardous wastes) effectively prohibits such mixing. Some commenters opposed the proposed mixture rule on the grounds that integrated facilities typically co-dispose of hazardous mineral processing wastes (including those exhibiting the TC) with extraction and beneficiation wastes, and desired to continue this practice or to have mixing available as a management option for these mineral processing hazardous wastes. It is well-documented that extraction and beneficiation wastes can often generate highly acidic environments. (See Acid Rock Drainage Prediction, U.S. EPA, 1994) Disposal of mineral processing wastes with such wastes means that the mineral processing wastes would be subject to acidic conditions that, in some cases, may be comparable to the acidic leacheate medium utilized in the TCLP (if not somewhat more aggressive). This is because water contacting the acidic waste would thereupon become acidic itself (an example being acid mine drainage). EPA's concern is that if the mineral processing wastes are no longer identified as hazardous because a test other than the TCLP is used, then these wastes could be disposed with the acidic extraction/beneficiation wastes and be exposed to metal-mobilizing acidic leaching conditions as water percolates through the mixture. Given the evident economies noted in the public comments in disposing of mineral processing wastes along with extraction/beneficiation wastes, such a scenario is at least plausible. Such a disposal scenario, which industry states is not only plausible, but is typical of some facilities, provides an additional justification for the application of the acidic leachate approach reflected in the TCLP.

EPA recognizes that the TCLP utilizes organic acids, while the disposal scenario discussed above would involve exposure to mineral acids. In part because of this difference, EPA utilized the SPLP in screening low hazard wastes as part of its 1989 Bevill determination. See 54 FR 36592 (Sept 1, 1989). Commenters have pointed to this statement as undercutting any application of TCLP to mineral processing wastes.

EPA made clear in 1989, however, that the TCLP was still the appropriate test for determining whether a particular mineral processing waste is a hazardous waste subject to Subtitle C. Morever, EPA believes that the general statement contained in the 1989 preamble arguably swept too broadly in its conclusions. Notwithstanding that statement, standard chemistry texts establish that certain metals are highly soluble in acidic environments, including inorganic acids. Numerous factors can affect the precise solubility of a particular metal, and it is generally not possible to generalize whether organic or inorganic acids would cause more or less of a particular metal compound to solubilize. Based on generally accepted chemistry principles, however, a highly acidic environment, whether organic or mineral in nature, can be aggressive towards certain metals typically found in mineral processing wastes. Given that acidic leaching media can result when mineral processing wastes are co-disposed with extraction/beneficiation wastes, EPA believes that the acidic leachate procedure utilized in the TCLP can be appropriate for characterizing mineral processing wastes.

EPA also notes a further policy justification in its choice of the TCLP. The final rule seeks to encourage properly conducted recycling of mineral processing secondary materials, and the scheme in the final rule (whereby recovery can occur provided facilities do not utilize land-based storage units) can be implemented at reasonable cost. (See the Regulatory Impact Analysis for the final rule, summarized later in this preamble.) However, the Agency is concerned that if integrated facilities have a lower cost option of simply disposing these mineral processing secondary materials with extraction/beneficiation wastes, facilities will choose this alternative. Thus, not only will the mineral processing wastes be potentially exposed to acidic leaching conditions, but properly conducted metal recovery will be foregone. (See RCRA section 1003 (a) (6) noting the statutory goal to encourage properly conducted recycling of hazardous wastes.)

In addition to questioning the choice of a leaching medium, commenters questioned certain other features of the test, notably a particle size feature which mirrors freeze/thaw cycles, and a dilution/attenuation factor which is premised on human receptors potentially living relatively proximate to the disposal site. These issues are addressed in greater detail in responses to comments and technical background documents. However, the Agency has documented in the record that many mineral processing facilities are located in parts of the country where freeze/thaw cycles which reduce particle size occur, and are also located near populations reflecting the degree of dilution and attenuation used in the model. (See *Population Studies of Mines and Mineral Processing Sites,* 1998, U.S. EPA)

Finally, EPA notes that nothing in the recent decision *Columbia Falls Aluminum Co. v. EPA* (no. 96–1234) (April 3, 1998) is contrary to this determination. *Columbia Falls* does not stand for the proposition that EPA must customize a test for particular wastes to reflect individual or even typical disposal circumstances, a proposition expressly rejected in *Edison*, 2 F. 3d at 445. Rather, *Columbia Falls* approvingly cites *Edison* for the proposition that ''the TCLP must bear some rational relationship to mineral wastes in order for the Agency to justify the application of the toxicity test to those wastes.' '' *Columbia Falls,* slip op. at 18; see also *Huls America Inc.* v. *Browner,* 83 F. 3d 445, 454 (*Edison* involved an instance ''where the record was barren of any rational relationship between the methodology used by the EPA to set regulatory levels and the known behavior of the substance to which this methodology was applied''). EPA has rectified the record deficiencies noted in *Edison*, showing how the TCLP ''bears a rational relationship to the reality it purports to represent.'' *Columbia Falls,* slip op. at 18. Today's action is thus consistent with both *Edison* and *Columbia Falls.*

EPA is making the decision to retain the TCLP as the test for identifying mineral processing wastes effective within 90 days, co-extensive with the LDR prohibition effective date. This effective date can be complied with feasibly within 90 days since the TCLP is already the applicable test for mineral processing wastes (since it was remanded, not vacated, by the *Edison* ruling). Thus, the regulated community does not need six months to come into compliance. See RCRA section 3010(b)(1).

b. Remanded Mineral Processing Wastes. In the January 1996 proposal, the Agency proposed to revoke the current hazardous waste listings for five court-remanded smelting wastes. The Agency also proposed not to re-list them as hazardous stating that these wastes would be regulated as hazardous wastes if they exhibit a characteristic of a hazardous waste.

In 1980, the Agency listed as hazardous eight wastes generated by primary metal smelters (45 FR 33066, 33124, 47832–34, (1980)). The Agency listed the wastes pursuant to 40 CFR 261.11(a)(3) because they contained one or more of the hazardous constituents listed in 40 CFR 261, Appendix VIII. The eight wastes are described as follows:

K064—Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production.
K065—Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.
K066—Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.
K067—Electrolytic anode slimes/sludges from primary zinc production.
K068—Cadmium plant leach residue (from oxide) from primary zinc production.
K088—Spent potliners from primary aluminum reduction.
K090—Emission control dust or sludge from ferrochromium-silicon production.
K091—Emission control dust or sludge from ferrochromium production.

In October of 1980, in response to Congressional enactment of the Bevill Exclusion, the Agency suspended its listing of the eight wastes (46 FR 4614–15, 27473 October, 1980). In 1985, EPA proposed a new rule that would relist six of the eight wastes (50 FR 40292, 40295, October 2, 1985). (The Agency chose not to propose to re-list two of the original eight waste streams (electrolytic anode slimes/sludges, K067, and cadmium plant leach residue, K068, from primary zinc production) because it found that industry was routinely recycling these secondary materials in an environmentally sound manner.) However, the Agency withdrew its 1985 proposal on October 9, 1986 (51 FR 36233).

In *Environmental Defense Fund v. EPA,* 852 F.2d 1316 (D.C. Cir. 1988) EPA was ordered to make a final decision regarding whether to re-list the six metal smelting wastes that it had proposed to list in 1985, and to reduce the scope of the Bevill exemption as it applies to mineral processing wastes. The Agency complied with this order when it re-listed the six wastes.

The American Mining Congress (AMC) challenged these listings. In *American Mining Congress v. EPA,* 907 F.2d 1179 (D.C. Cir., 1990) the Court upheld the Agency's decision to re-list waste K088, spent potliners from primary aluminum reduction, but found that the Agency's record for the five remaining waste streams did not adequately address certain issues raised in comments during the rulemaking. Since the Court did not vacate the listings, they technically remain in effect.

In today's rule, the Agency is revoking the five remanded waste listings. The Agency has found that several of these wastes are still generated and in some cases land disposed, but there is a lack of information demonstrating threats to human health or the environment that would justify a listing at this time. The Agency believe that some wastes, specifically copper acid plant blowdown (K064) and surface impoundment solids at primary lead smelters (K065), are inherently hazardous due to the presence of arsenic and lead, respectively. These wastes can be effectively regulated under RCRA Subtitle C if they exhibit a hazardous characteristic.

The Agency received no comments opposing the proposed rule. To summarize, the Agency is revoking the listing for, and is not re-listing: copper acid plant blowdown (K064); surface impoundment solids at primary lead smelters (K065); acid plant blowdown from primary zinc production (K066); emission control dust and sludge from ferrochromium-silicon production (K090); and emission control dust or sludge from ferrochromium production (K091). However, as explained previously, should these wastes exhibit a characteristic of a hazardous waste, they will be subject to hazardous waste regulations, including the hazardous waste mixture rule.

c. Lightweight Aggregate Mineral Processing Wastes. In the January 1996 proposal, the Agency proposed that air pollution control dust and sludge from the production of lightweight aggregate be classified as a mineral processing waste that is no longer eligible for the Bevill exemption. Lightweight aggregate air pollution control (APC) dust and sludge were among the many mineral processing wastes made conditionally exempt from RCRA Subtitle C requirements under the 1980 Bevill Amendment to RCRA. In 1990, following more detailed study of the generation rates for this waste, the Agency determined that it did not qualify for the Bevill exemption (55 FR 2322, 2340, January 23, 1990). In 1991, the D.C. Circuit directed the Agency to reconsider, after providing notice and soliciting comments, whether these wastes qualify for the Bevill exemption. (*Solite Corporation v. EPA,* 952 F.2d at 500 (D.C. Cir. 1991)).

In the January 1996 proposal, the Agency stated that the wastes from lightweight aggregate production do not meet the high volume criterion for excluded mineral processing wastes. For purposes of EPA's 1989 and 1990 rules concerning Bevill eligibility for mineral processing wastes, high volume is defined as greater than 45,000 metric tons per year per facility, for a solid waste, or 1,000,000 metric tons per year per facility, for a liquid waste, averaged across all facilities generating a particular waste.

To determine whether APC dust and sludge from lightweight aggregate production satisfied the high volume criterion, the Agency analyzed data from its 1989 National Survey of Solid Wastes from Mineral Processing Facilities (SWMPF Survey) and data from public comments submitted by affected companies. The Agency finds that the lightweight aggregate wastes do not meet the high volume criterion.

None of the methods used resulted in a volume estimate that is greater than 45,000 metric tons per year per facility, the high volume criterion for mineral processing wastes. SWMPF survey data, which includes Confidential Business Information (CBI) from two facilities have been included in a separate analysis. The results, which remain confidential, are not substantially different from the results presented previously.

Solite acknowledged in comments that data do not support a determination that lightweight aggregate air pollution control (APC) dust and sludge is generated in volumes that meet the high volume cutoff. However, Solite requested that the Agency delay making a final determination on the Bevill status of its wastes due to other Agency rulemaking activities dealing with cement kiln dusts, which Solite contends would be addressing similar issues to those posed by lightweight aggregate air pollution control (APC) dust and sludge.

The Agency is aware that both cement kiln and aggregate kilns may both burn hazardous wastes fuels and that the dusts from air pollution control devices are often blended into final products. Under existing regulations, if these dusts resulting from burning listed hazardous waste fuels are blended into products that are used on the land, the product would be subject to RCRA's ''derived from'' rules which would render the product a hazardous waste. Since both cement and light weight aggregate products are usually placed on the land, the potential impacts on their use could be significant. The Agency noted in its 1993 *Report to Congress on Cement Kiln Dust* (CKD) that it did not have evidence that CKD was materially different when generated from kilns burning hazardous wastes as fuel and those which did not. The Agency does not have similar comparable analysis of light weight aggregate dusts and sludges, and can not at this point in time conclude that there is no difference between dusts and sludges from units burning hazardous waste fuels and those that do not. The Agency wants to encourage the sound recycling of these dusts and requires additional time to assess how to ensure that aggregate and cement kiln dusts are managed to ensure protection of human health and the environment. The Agency is currently developing a regulatory program for the safe management of cement kiln dusts and anticipates issuing a proposed rule in 1998. The Agency further anticipates that it will seek comment on how to best manage both wastes in this proposal and will seek information it needs to make a final determination on the status of lightweight aggregate wastes. The Agency is not finalizing its technical background document, *Lightweight Aggregate Production and Air Pollution Control Wastes* (1995), at this time.

d. Mineral Processing Wastes From the Production of Titanium Tetrachloride. (i) Summary. In 1989, following a study of this waste's circumstances of generation, the Agency determined that titanium tetrachloride waste acid did not qualify for the Bevill exemption because it was a mineral processing waste, not an extraction/beneficiation waste, and did not meet the high volume/low hazard criteria for determining eligibility for the Bevill exemption. (See 54 FR 36592, September 1, 1989.) One producer of titanium tetrachloride, DuPont, requested a determination that waste from its production process be categorized as beneficiation waste on the ground that, unlike processes used by other manufacturers, their process included a beneficiation step which generated the wastes at issue. However, EPA determined that DuPont's waste acids were mineral processing wastes. DuPont challenged this decision, and the Court remanded EPA's decision for further consideration on the grounds that the Agency's explanation for its decision was unclear. *Solite Corporation* v. *EPA*, 952 F.2d 473,494–95 (D.C. Cir. 1991).

DuPont submitted comments on the January 1996 proposal that contend its processes do not destroy the structure of the mineral as it is placed into its processes. The Agency does not accept this contention, and, as described below, finds that the waste iron chloride acid is a mineral processing wastes.

There are four sequential steps in DuPont's chloride-ilmenite process, the first two of which occur within the same vessel: (1) chlorine gas reacts with iron from the ilmenite ore to form iron chloride gas; (2) chlorine gas reacts with titanium in the ilmenite ore to form titanium tetrachloride gas; (3) the iron chloride is condensed and separated to form a waste iron chloride acid; and finally (4) the titanium tetrachloride is condensed and processed to form titanium oxide pigment, the saleable product. The issue remanded in *Solite* is whether the iron chloride acid waste, which is produced in gaseous form at step (1) but removed from the vessel as a liquid at step (3), is a mineral processing waste that does not qualify for the Bevill exemption, or is a beneficiation waste covered by the Bevill exclusion under 40 CFR 261.4(b)(7).

(ii) Proposal. In the January 1996 proposal, the Agency proposed that iron chloride waste acid from the production of titanium tetrachloride be classified as a mineral processing waste that is not eligible for the Bevill exemption. In the chloride-ilmenite production of titanium tetrachloride, the Agency found that mineral processing began with the chlorination of the iron in the ilmenite ore and the resulting acid is a waste from mineral processing. Specifically, the Agency found that the acid wastes from this process are not physically or chemically similar to the feedstocks entering the operation, which is indicative that mineral processing has occurred.

(iii) Response to Comments. One commenter agreed with EPA's proposed conclusion that Du Pont's process is properly classified as mineral processing because the reaction of ilmenite ore with chlorine gas forms new chemical compounds, namely titanium tetrachloride and ferric or ferrous chloride. The commenter remarked that such a reaction is a chemical processing step that fundamentally alters the make-up of the feedstock ore. The commenter said that EPA correctly drew the analogy between the mineral processing that occurs in the chloride-ilmenite operation and the mineral processing that occurs in other metallurgical operations.

One commenter noted that no beneficiation occurs in the chloride-ilmenite process at all and that the iron chloride waste stream is not eligible for the Bevill exemption. The commenter said that it too produces a waste iron chloride acid in the production of titanium tetrachloride but its waste acid is neutralized in a waste treatment unit. The commenter provided data showing that its treatment of waste iron chloride acid meets all proposed Land Disposal Restrictions (LDR) treatment standards for underlying hazardous characteristics.

DuPont objected to the Agency's proposed classification. DuPont claims that the removal of iron from the ilmenite ore is more appropriately classified as beneficiation. DuPont remarked that the separation of the iron chloride from the titanium ore grains results in a beneficiated ore, similar in nature to commercially available beneficiated ores that EPA has determined are Bevill exempt. The Agency disagrees with this characterization, and concludes that since the ore is chlorinated, that chlorination step changes the physical and chemical structure of ore. The Agency's rationale for this decision is discussed below.

The Agency reiterates its broad standard for making mineral processing determinations described in 54 Fed. Reg. 36592, 36616, September 1, 1989. Specifically, beneficiation operations typically serve to separate and concentrate the mineral values from waste material, remove impurities, or prepare the ore for further refinement. Beneficiation activities do not, however, change the chemical structure of the ore. Mineral processing operations, in contrast, generally follow beneficiation and serve to change the concentrated mineral value into a more useful chemical form and change the chemical composition of the waste. In contrast to beneficiation operations, processing activities often destroy the physical structure of the incoming ore or mineral feedstock such that the materials leaving the operation do not closely resemble those that entered the operation. Typically, beneficiation wastes are earthen in character, whereas mineral processing wastes are derived from melting or other chemical changes.

Today, the Agency again finds that DuPont's chloride-ilmenite operation is mineral processing. In DuPont's process, chlorine gas is reacted with the iron in the ore in the first step to produce a new and significantly different chemical compound than the feedstock ore, namely liquid waste iron chloride acid. The iron is more than simply removed; the solid iron in the ore undergoes a chemical reaction with the chlorine gas to form a new compound that is highly reactive and non-earthen in character, namely iron chloride gas. This reaction is the beginning of a significant change to the physical and chemical structure of the ore. This change is similar to the reaction of chlorine gas with solid titanium to form titanium tetrachloride gas. The Agency finds that the net result of the reaction of chlorine gas with both iron and titanium, which occur in the same vessel, destroys the physical and chemical nature of the ore.

DuPont contends that the formation of iron chloride gas is simply a process to remove an impurity from the ore. DuPont noted in its comments that activities which remove impurities from ores and minerals are classified as beneficiation and all wastes from beneficiation are exempt from regulation under RCRA Subtitle C (see 40 CFR 261.4). DuPont therefore contends that their processes are in fact beneficiation and should not be classified as mineral processing.

As noted earlier, the Agency clarified the definition of beneficiation and mineral processing in its 1989 rulemaking. That rule clearly indicated that beneficiation serves to remove impurities as long as the resultant materials remained earthen in nature and had not undergone a physical/chemical change. The Agency studied the DuPont process numerous times and met with the company several times to assure that the Agency fully understood DuPont process. The Agency concludes that chlorination of the ore causes a significant physical/chemical change to the ore, and therefore the process is more indicative of mineral processing than beneficiation. Further, in the DuPont case, the removal of impurities is taking place simultaneously with other reactions generating titanium gases. This reaction alone would classify the process as mineral processing since the ore and titanium gas are clearly physically and chemically dissimilar from that point on in the process. The Agency stated in 1989 that once mineral processing began, all wastes generated after that point would be classified as mineral processing wastes, even those wastes which are similar to those generated in beneficiation.

Thus, all wastes associated with the chloride-ilmenite production of titanium tetrachloride are mineral processing wastes. They are neither high volume nor low toxicity and therefore are not eligible for the Bevill exemption.

VII. LDR Treatment Standards for Soil

This section discusses final regulations establishing land disposal treatment standards specific to contaminated soil. Contaminated soil is subject to the land disposal restrictions, generally, when it contains a listed hazardous waste or when it exhibits a characteristic of hazardous waste. (Throughout this discussion, the specific term ‘‘hazardous contaminated soil’’ refers to soil which contains a listed hazardous waste or exhibits a characteristic of hazardous waste; the more general term ‘‘contaminated soil’’ refers to both hazardous contaminated soil and other soils—such as decharacterized soil—which may be subject to the land disposal restrictions.) Prior to today’s rule, contaminated soil subject to LDRs was subject to the same land disposal restriction treatment standards that apply to industrial hazardous waste: soil contaminated by listed hazardous waste was subject to the standards that apply to those listed wastes and soil that exhibited a characteristic of hazardous waste was subject to the same standards that apply to the characteristic waste. Today’s final rule establishes a new treatability group—contaminated soils—and establishes land disposal restriction treatment standards specifically tailored to that treatability group. Although EPA believes generators of contaminated soil will typically choose to comply with the new soil treatment standards promulgated today, under today’s final rule, they have the option of complying either with the existing treatment standards for industrial hazardous waste (i.e., the universal treatment standards) or the soil treatment standards. This is consistent with the approach the Agency took in promulgating LDR treatment standards for hazardous contaminated debris. 57 FR 37221, August 18, 1992.

EPA first proposed tailored land disposal restriction treatment standards for contaminated soil in September 1993. 59 FR 48122—48131 (September 14, 1993). In the September 1993 proposal, EPA requested comment on three soil treatment standard options. These three options involved various combinations of percent reduction requirements for hazardous constituents (typically ninety percent—90%) and multipliers of the universal treatment standards (typically ten times the UTS—10 x UTS). In response to comment on the September 1993 proposal, EPA deferred a final decision on soil treatment standards to the Agency’s broader evaluation of application of RCRA requirements to remediation wastes, the Hazardous Waste Identification Rule for Contaminated Media, or HWIR-Media.

On April 29, 1996, as part of the HWIR-Media proposal, EPA again proposed tailored land disposal restriction treatment standards for contaminated soils. 61 FR at 11804 (April 29, 1996). In the April 29, 1996 proposal, soil-specific treatment standards would have required reduction in concentrations of hazardous constituents by 90% with treatment for any given constituent capped at ten times the universal treatment standard. *Id.* This is commonly referred to as ‘‘90% capped at 10 times UTS.’’

In 1995, 1996 and 1997, EPA proposed new land disposal restriction treatment standards for waste identified as hazardous because of metal content and for mineral processing wastes. 60 FR 43654 (August 22, 1995) for metal wastes; 61 FR 2338 (January 25, 1996) for mineral processing wastes; and, 62 FR 26041 (May 12, 1997) supplemental proposal for both types of waste. In these proposals, soil contaminated with metal or mineral processing waste would have been subject to the new treatment standards for those wastes. This was consistent with the way EPA had historically addressed contaminated soil and, at the time, considered proper given that the proposals to establish soil-specific treatment standards were not yet resolved.

EPA did not reopen the issue of whether LDRs apply to contaminated soil or whether it is appropriate to require that contaminated soil achieve the same LDR treatment standards as the contaminating waste (soil contaminated by listed waste) or the characteristic property (soil that exhibits a characteristic of hazardous waste) in the August 22, 1995, January 25, 1996, or May 12, 1997 proposals. Commenters, nonetheless, strongly opposed application of the new LDR treatment standards for metal and mineral processing wastes to soil contaminated with those materials. At about the same time, EPA decided to go forward with the soil-specific LDR treatment standards proposed in April 1996. Therefore, the Agency is promulgating the land disposal restriction treatment standards tailored to contaminated soils proposed on April 29, 1996 (i.e., 90% capped at 10xUTS) today, with the new LDR treatment standards for metal and mineral processing wastes. The soil-specific treatment standards promulgated today may be applied to any contaminated soil that is restricted from land disposal, including but not limited to soil contaminated by metal and mineral processing wastes.

The land disposal restriction treatment standards for contaminated soil promulgated today differ from the standards proposed on April 29, 1996 in three major ways. First, the Agency proposed that the soil treatment standards would be available only for contaminated soil that was managed under an approved cleanup plan (termed a remediation waste management plan, or RMP). In today’s final rule, the Agency is making the soil treatment standards available for all contaminated soil that is restricted from land disposal. Second, the Agency proposed that, for soil contaminated by listed hazardous waste, treatment would be required only for the hazardous constituents that originated from the contaminating listed hazardous waste. When the soil treatment standards are used, today’s final rule requires all hazardous contaminated soil, including soil contaminated by listed hazardous waste, to be treated for each underlying hazardous constituent reasonably expected to be present when such constituents are initially found at concentrations greater than ten times the universal treatment standard. Third, in response to comments asserting that the proposed regulations governing the applicability of LDRs to contaminated soils were difficult to understand, the Agency has reformatted these regulations into an easier-to-read table. These changes, as well as other significant issues associated with the soil treatment standards and responses to comments, are discussed below.

Today’s promulgation of land disposal restriction treatment standards specific to contaminated soil is largely based on the April 29, 1996 proposal (62 FR at 18804–18818). It also relies on the Agency’s first effort to establish soil-specific treatment standards, the LDR Phase II proposal (58 FR 48092, September 14, 1993). Today’s action resolves the portions of the April 29, 1996 and September 14, 1993 proposals that address land disposal restriction treatment standards for contaminated soil. However, other elements of the April 29, 1996 proposal remain open and will be acted on in a future rulemaking. Responses to comments submitted on the soil treatment standards proposals are included in the Soil Treatment Standards Response to Comments Background Document, available in the docket for today's action.

A. Application of Land Disposal Restriction Treatment Standards to Contaminated Soil and Justification for Soil Specific LDRs

Prior to today's rule, soil that contained listed hazardous waste or exhibited a characteristic of hazardous waste were prohibited from land disposal unless they had been treated to meet the treatment standards promulgated for pure industrial hazardous waste. This means the same treatment standards which apply to a pure, industrial hazardous waste were also applied to contaminated soil. 61 FR at 18804 (April 29, 1996) and other sources cited therein. In most cases then, contaminated soils were subject to the treatment standards listed in 40 CFR 268.40, and the associated treatment standards in 40 CFR 268.48(a) table Universal Treatment Standards (UTS).[14]

As EPA has discussed many times, the treatment standards developed for pure, industrial hazardous waste may be unachievable in contaminated soil or may be inappropriate for contaminated soil due to particularities associated with the soil matrix and the remediation context under which most contaminated soil is managed, as discussed below. For that reason, EPA is promulgating today's LDR treatment standards specifically tailored to contaminated soil and to the remedial context.

With respect to the soil matrix, the treatment standards developed for pure hazardous waste (i.e., the universal treatment standards) are generally either technically unachievable or technically or environmentally inappropriate. For metal constituents, the UTS may not be achievable in contaminated soil even using model technologies such as stabilization or high temperature metal recovery. Stabilization technologies are sensitive to soil characteristics such as the presence of oxidizing agents and hydrated salts, the distribution of soil particle size and the concentrations of sulfate and chloride compounds. Various combinations of soil characteristics can impair the effectiveness or rate of reaction in stabilization technologies. For example, insoluble materials, such as materials that will pass through a number 200 mesh sieve, can delay setting and curing during stabilization, or small soil particles can coat larger soil particles weakening bonds between particles and cement or other reagents. High temperature metal recovery technologies may not be appropriate for some contaminated soil given the low concentrations of metals that might be present in the soil. In addition, clay and silt content in some soil matrices may add undesired impurities to the metal concentrates or alloys that are formed during high temperature metal recovery.

Although EPA has data showing that some soils can be treated to the existing universal treatment standards for metals using stabilization[15] and high temperature metals recovery, the Agency continues to believe that tailored soil treatment standards are appropriate for metal contaminated soil to ensure that the wide variety of soils can be effectively treated to meet the treatment standards. In addition, the soil treatment standards will have the added environmental benefit of encouraging greater use of innovative soil treatment technologies such as soil or enhanced soil (acid) washing. See, Proposed BDAT Background Document for Hazardous Soils, August 1993; Technical Resource Document: Solidification/Stabilization and its Application to Waste Materials, EPA/530/R–93/012, June 1993; and, Technology Screening Guide for Treatment of CERCLA Soils and Sludges, EPA 540/2–88/004, September 1988.

For soil contaminated with organic constituents, EPA has noted many times that, notwithstanding the fact that such soils can be treated by combustion to meet the universal treatment standards, it is generally unsuitable or impractical from a technical standpoint to combust large volumes of mildly contaminated soil. See, for example, 55 FR at 8760 and 8761 (March 8, 1990) and 61 FR 18806–18808 (April 29, 1996). In addition, the Agency has documented potential difficulties that may arise from the combustion of soil 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. Proposed BDAT Background Document for Hazardous Soils, August 1993 and Technology Screening Guide for Treatment of CERCLA Soils and Sludges, EPA 540/2–88/004, September 1988.

With respect to the remedial context, EPA, the states, and the regulated and environmental communities have long recognized that application of the LDR treatment standards developed for pure, industrial hazardous waste to contaminated soil can be counterproductive. See, for example, ''Hazardous Waste: Remediation Waste Requirements Can Increase the Time and Cost of Cleanups' U.S. General Accounting Office, GAO/RCED–98–4, October 1997. Application of LDRs developed for pure, industrial hazardous waste to contaminated soil often presents remediation project managers with only two choices: pursue a legal option of capping or treating hazardous contaminated soil in place thereby avoiding a duty to comply with LDRs, or excavate the soil and treat it to the full extent of best demonstrated available technology, usually, for organic constituents, incineration. EPA has found that this situation often creates an incentive to select remedies that minimize application of LDRs (e.g., remedies that involve capping or leaving untreated soil in place) a result obviously not contemplated by Congress in enacting the LDR program.[16] 62 FR at pages 64505–64506 (Dec. 5, 1997) and 61 FR at 18808 (April 29, 1996) and other sources cited therein.

Because of the differences between the remedial context (responding to wastes which have already been released to the environment) and

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[14] The exception is when waste contaminating soil is subject to a specified treatment method; in that case, the contaminated soil would also be subject to the specified treatment method.

[15] These soil treatment data have been claimed as confidential business information.

[16] As discussed in the April 29, 1996 proposal, EPA has, in the past, justified the existing treatment standards, in part, because they create an incentive to generate less of the affected waste in the first instance. See, Steel Manufactures Association v. EPA, 27 F.3d 642, 649 (D.C. Cir. 1994). In the remedial context, the waste is already in existence; therefore waste minimization is not an issue. Thus, application of the current LDR treatment standards to remediation waste can have the perverse effect of creating an incentive to avoid ''generating'' waste by leaving it in the ground. The Agency believes that the goals of remediation are better served by more aggresive remedial approaches, such as excavation and management (including some degree of treatment) of remediation wastes, that generally result in more permanent remedies. Such approaches should, therefore, be encouraged.

regulation of wastes generated by on-going industrial process (preventing wastes from being released into the environment in the first instance), EPA has rejected the conclusion that treatment standards for soil must be based upon the performance of the ''best'' demonstrated available treatment technology in the way the Agency has historically interpreted these terms. Instead, the Agency has chosen to develop soil treatment standards that can be achieved using a variety of treatment technologies which achieve substantial reductions in concentration or mobility of hazardous constituents and, because they are generally used to treat contaminated soils in remedial settings, do not present site managers with the type of dilemma described above. As EPA has long maintained, the strong policy considerations that argue for using the traditional BDAT analysis as the basis for LDR treatment standards for hazardous wastes generated by on-going industrial operations do not apply when evaluating BDAT in the remedial context. In the remedial context, for example, waste minimization is not an issue and the additional increment of treatment necessary to achieve traditional BDAT may yield little if any environmental benefit over other treatment options that adequately protect human health and the environment. 54 FR 41568 (October 19, 1989). Indeed there is a legitimate question as to whether a technology whose use results in foregoing other substantial environmental benefits (such as more aggressive, permanent remedies) can be considered a ''best'' technology. *Portland Cement Association* v. *Ruckelshaus*, 486 F. 2d 375, 385–86 at n. 42 (D.C. Cir. 1973); Essex Chemical Corp. v. Ruckelshaus, 486 F. 2d 427, 439 (D.C. Cir. 1973). This issue was discussed fully in the April 29, 1996 proposal and in a number of other EPA documents, see, for example, 54 FR 41568 (October 19, 1989) and 61 FR at 18808 (April 29, 1996) and other sources cited therein.

The soil treatment standards promulgated today will significantly improve management of contaminated soil and remediations that involve contaminated soil. However, the Agency emphasizes that today's rule does not resolve the larger, more fundamental issues associated with application of RCRA Subtitle C to remediation generally. The Agency maintains that additional reform is needed to address, more fundamentally, the application of certain RCRA subtitle C requirements to all remediation wastes, including contaminated soil. The Agency will continue to participate in discussions of potential legislation to promote this additional needed reform. If legislation is not forthcoming, the Agency may reexamine its approach to remediation waste management, including the soil treatment standards.

B. Detailed Analysis of Soil Treatment Standards

All land disposal restriction treatment standards must satisfy the requirements of RCRA section 3004(m) by specifying levels or methods of treatment that ''substantially diminish the toxicity of the waste or substantially reduce the likelihood of migration of hazardous constituents from that waste so that short-term and long-term threats to human health and the environment are minimized.'' As EPA has discussed many times, the RCRA Section 3004(m) requirements may be satisfied by technology-based standards or risk-based standards. This conclusion was upheld in Hazardous Waste Treatment Council v. EPA, 886 F.2d 355, 362–64 (D.C. Cir. 1989), where technology-based LDR treatment standards were upheld as a permissible means of implementing RCRA Section 3004(m) provided they did not require treatment beyond the point at which threats to human health and the environment are minimized. Today's treatment standards for contaminated soils are primarily technology-based; however, a variance from the technology-based standards is allowed when EPA or an authorized state makes a site-specific determination that threats posed by land disposal of any given volume of contaminated soil are minimized at higher concentrations.

1. Technology Basis for Soil Treatment Standards

The land disposal restriction treatment standards for soil require that concentrations of hazardous constituents subject to treatment be reduced by ninety percent (90%) with treatment for any given constituent capped at ten times the universal treatment standard (10 X UTS). In other words, if treatment of a given constituent to meet the 90% reduction standard would reduce constituent concentrations to less than 10 X UTS, treatment to concentrations less than 10 X UTS is not required. This is commonly referred to as ''90% capped by 10xUTS.''

As first discussed in the September 14, 1993 proposal, the Agency has not used the statistical methods historically used in the land disposal restriction program to establish the soil treatment standards. In the past, the Agency has typically evaluated treatability data to identify the ''most difficult to treat'' waste and established treatment standards based on a statistical analysis of data from the best demonstrated available treatment technology for that waste. See, for example, 55 FR 26594 and 26605, June 23, 1989. While the existing regulations allow treatment using any technology that will satisfy the treatment standards, the practical impact of that approach is that treatment using the most aggressive treatment technology available (i.e., for organic constituents, destruction of organic constituents based upon the performance of incineration) is often necessary to achieve the treatment standards.

For contaminated soil, the Agency has chosen to establish technology-based soil treatment standards at levels that are achievable using a variety of common remedial technologies which destroy, remove or immobilize substantial amounts of hazardous constituents. 58 FR 48129 (September 14, 1993). The levels chosen—90% reduction capped at 10 X UTS—are within the zone of reasonable levels the Agency could have selected as treatment standards for contaminated soil.

Soil treatability data from EPA's Soil Treatment Database indicate that the soil treatment standards are achievable and that the Agency has selected a reasonable level of performance for the standard. After screening the Database to eliminate data from tests reflecting poorly designed or operated treatment, tests where EPA believes inappropriate technologies were applied (for example, data from ''immobilization'' of organic constituents), and other inappropriate data, the Agency was left with 2,541 data pairs representing treatment of eighty hazardous constituents including nine BDAT list metals.[17] EPA then analyzed these data to determine if the soil treatment standards could be reliably achieved using demonstrated soil treatment technologies. Based on this analysis, the Agency concluded that the soil treatment standards can be reliably achieved using a variety of available soil treatment technologies. The Agency concluded that the soil treatment standards can be reliably achieved using: biological treatment, chemical extraction, dechlorination, soil washing, stabilization and thermal desorption. Of course, since soil treatment is generally matrix dependent, the exact treatment technology which

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[17] A complete discussion of the Agency's method for screening the Soil Treatment Database can be found in the LDR Phase II proposal (58 FR 48129—48131, September 14, 1993) and the Best Demonstrated Available Technology Background Document for Hazardous Soil (August 1993).

might be applied to any given contaminated soil will depend on the specific properties of the soil and the hazardous constituents of concern. Choices about which soil treatment technology to apply should be informed by appropriate use of bench and pilot scale studies and good engineering judgement. EPA acknowledges that the treatment efficiency necessary to achieve the soil treatment standards will depend on, among other things, the initial concentrations of hazardous constituents in any given volume of contaminated soil. Thus, not all soil treatment technologies will be capable of treating every contaminated soil to meet the standards adopted in this rule. However, the Agency finds that the soil treatment standards typically can be achieved by at least one of the demonstrated technologies, even in the case of hard-to-treat hazardous constituents such as dioxins and furans, polychlorinated biphenyls, and polynuclear aromatics.

Furthermore, the Agency has concluded that it is appropriate to express the soil treatment standards as a treatment performance goal capped by specific treatment levels. More specific standards, for example, a single numerical standard for all soil, could be counterproductive—less often achievable—given the varying combinations of hazardous constituents and soil properties that might be encountered in the field. 58 FR 48130 (September 14, 1993). An express objective of this rule is to increase the range of appropriate treatment alternatives available to achieve the LDR treatment standards in soil to increase the likelihood that more remediations will include treatment as a component of the remedy. This objective could be impeded by adopting single numeric values as treatment standards, since that approach would reduce needed flexibility. The resulting soil treatment standards, while still technology-based, thus depart from EPA's past methodology developed for process wastes in that they are not based exclusively on the application of the most aggressive technology to the most difficult to treat waste and are not expressed as a single numeric value.

Like any land disposal restriction treatment standard, the soil treatment standards may be achieved using any treatment method except treatment methods which involve impermissible dilution (e.g., addition of volume without destroying, removing or immobilizing hazardous constituents or transfer of hazardous constituents from soil to another medium such as air). For organic constituents, the soil treatment standards for volatile organic constituents are based on the performance of biotreatment, chemical extraction, dechlorination, thermal desorption or soil vapor extraction. The standards for semivolatile organic constituents are based on the performance of biotreatment, chemical extraction, dechlorination, soil washing, thermal desorption, or soil vapor extraction. The standards for organochlorine pesticides are based on the performance of biotreatment, dechlorination, hydrolysis, or thermal desorption. The standards for phenoxyacetic acid pesticides are based on the performance of dechlorination. The standards for polychlorinated biphenyls are based on the performance of chemical extraction, dechlorination, or thermal desorption. The standards for dioxins and furans are based on the performance of dechlorination or thermal desorption. EPA does not have specific data in the record on treatment of organophosphorous insecticides. Because they are based on a similar chemical structure, these contaminants, however, are likely as difficult to treat as other polar nonhalogenated organic compounds and are expected to respond to treatment in a manner similar to other polar nonhalogenated phenols, phenyl ethers, and cresols. Therefore, EPA believes that organophosphorous insecticides can be treated using the same technologies as would otherwise be used to treat polar nonhalogenated organics, i.e., biotreatment, chemical extraction, or thermal desorption. For all organic constituents the soil treatment standards are also achievable using combustion. EPA notes also that a number of judicial opinions have upheld EPA's extrapolation of achievability results for technology-based treatment standards based on chemical structure and activity similarity, as has been used here. See, e.g., *Chemical Manufacturers Ass'n* v. *EPA*, 870 F. 2d 177, 248 (5th Cir. 1989) and *National Ass'n of Metal Finishers* v. *EPA*, 719 F. 2d 624, 659 (3d Cir. 1983). For metals, the soil treatment standards are based on the performance of stabilization, and for mercury, chemical extraction. Achievability of the soil treatment standards is discussed, in detail, in section VII.B.8 of today's preamble.

a. Measuring Compliance With the Soil Treatment Standards For hazardous constituents which have a treatment standard measured by total waste analysis (i.e. standards for organic constituents and for cyanide), compliance with the 90% reduction standard should generally be measured using total constituent concentrations. For hazardous constituents which have a treatment standard measured based on concentrations in a TCLP extract (i.e., standards for metals and for carbon disulfide, cyclohexanone and methanol), compliance with the 90% reduction standard should generally be measured in leachate using the toxicity characteristic leaching procedure. The exceptions to these rules would be, for example, if soils contaminated with metal constituents were treated using a technology which removed or destroyed, rather than stabilized, metals. In an example like this, compliance with the 90% reduction standards should generally be measured using total constituent concentrations.

EPA takes this opportunity to clarify that when establishing the concentrations of hazardous constituents in any given volume of contaminated soil from which the 90% reduction will be measured, normal soil characterization techniques and procedures for representative sampling should be used. For example, it is not necessary to measure the 90% reduction from the soil sample with the lowest concentrations of hazardous constituents. EPA will publish additional guidance on establishing and validating 90% reduction levels for contaminated soil in the near future.

Today's rule does not change existing policies or guidance on soil sampling or site characterization. Although soil is often characterized using composite sampling, EPA notes that, consistent with the way the Agency measures compliance with other LDR treatment standards, compliance with the soil treatment standards will be measured and enforced using grab samples. This is appropriate because well-designed and well-operated treatment systems should ensure that soil is uniformly treated.

b. Major Comments A number of commenters expressed concern about the achievability of the soil treatment standards and/or the methodology EPA used to develop the soil treatment standards. These concerns are discussed in Section VII.B.8 of today's preamble and in the response to comments document, available in the docket for today's rulemaking.

2. The Soil Treatment Standards Satisfy RCRA Section 3004(m) Requirements

The technology-based ''90% capped by 10 X UTS'' treatment standard for contaminated soil is sufficiently stringent to satisfy the core requirement of RCRA Section 3004(m) that short-term and long-term threats to human health and the environment posed by land disposal are minimized. Technology-based standards provide an objective measure of assurance that hazardous wastes are substantially treated before they are land disposed, thus eliminating the ''long-term uncertainties associated with land disposal.'' Eliminating these uncertainties was a chief Congressional objective in prohibiting land disposal of untreated hazardous wastes. Hazardous Waste Treatment Council v. EPA, 886 F.2d at 361–64. In addition, the extent of treatment required, 90 % reduction capped at treatment to concentrations within an order of magnitude of the UTS, ''substantially'' reduces mobility or total concentrations of hazardous constituents within the meaning of RCRA Section 3004(m)(1).

EPA has made two changes from proposal which strengthen the soil treatment standards to assure that they minimize threats to human health and the environment. First, the Agency has modified its approach to which hazardous constituents will be subject to treatment. In today's rule, when the soil treatment standards are used, EPA requires treatment for all hazardous constituents reasonably expected to be present in contaminated soil when such constituents are initially found at concentrations greater than ten times the universal treatment standard. This treatment is required both for soil contaminated by listed hazardous waste and soil that exhibits (or exhibited) a characteristic of hazardous waste. Constituents subject to treatment are discussed further in Section VII.B.4 of today's preamble.

To further ensure that contaminated soil treated to comply with the soil treatment standards is safely managed, EPA has included additional restrictions on the use of treated contaminated soil in hazardous waste-derived products that are used in a manner constituting disposal (i.e., when such products will be placed on the land). The restrictions on use of treated contaminated soil in hazardous waste-derived products that are used in a manner constituting disposal are discussed in Section VII.B.5 of today's preamble.

Finally, the Agency reiterates that, in the remediation context, in assessing whether threats posed by land disposal have been minimized, one should appropriately consider the risks posed by leaving previously land disposed waste in place as well as the risks posed by land disposal of waste after it is removed and treated. 62 FR at 64506 (December 5, 1997). For example, if a treatment standard for organic constituents based on performance of incineration typically results in already land disposed materials such as contaminated soils being capped in place rather than more aggressively remediated, threats posed by land disposal of the waste ordinarily would not be minimized. Conversely, a treatment standard that results in substantial treatment followed by secure land disposal can be said to minimize threats, taking into account the totality of threats posed (i.e. including those posed if the soil were left in place untreated). *Id.* The soil treatment standards will ordinarily ensure that contaminated soil is appropriately treated within the meaning of RCRA Section 3004(m), considering both the threats posed by new land disposal of treated soil and the threats posed by on-going land disposal of existing contaminated soil (e.g., if the soil were left in place untreated).

EPA recognizes that some people may be concerned that a situation may arise where the soil treatment standards are at levels that are higher than those that EPA or an authorized state believes should be required for soil cleanup under a cleanup program. The Agency acknowledges that this may occur. The soil treatment standards, like other land disposal restriction treatment standards, are based on the performance of specific treatment technologies. As discussed earlier in today's preamble, technology-based standards have been upheld as a permissible means of implementing RCRA Section 3004(m). Most soil cleanup levels are based not on the performance of specific treatment technologies but on an analysis of risk. For this reason, technology-based treatment standards will sometimes over-and sometimes under-estimate the amount of treatment necessary to achieve site-specific, risk-based goals.

The purpose of the land disposal restriction treatment standards is to ensure that prohibited hazardous wastes are properly pre-treated before disposal (i.e., treated so that short- and long-term threats to human health and the environment posed by land disposal are minimized). As discussed above, the Agency believes the soil treatment standards promulgated today fulfill that mandate for soil that contains prohibited listed hazardous waste or exhibits a characteristic of prohibited hazardous waste. However, technology-based treatment standards are not necessarily appropriate surrogates for site-specific risk-based cleanup levels. In a circumstance where the soil treatment standards result in constituent concentrations that are higher than those determined, on a site-specific basis, to be required for soil cleanup, existing remedial programs such as RCRA Corrective Action, CERCLA and state cleanup programs could be applied to ensure that remedies are adequately protective. These programs already ensure protection of human health and the environment when managing most contaminated soils—i.e., soils that are not subject to the LDRs—and other remediation wastes. Furthermore, as discussed later in today's rule, treated contaminated soil would remain subject to regulation under RCRA Subtitle C unless and until EPA or an authorized state made an affirmative decision that the soil did not contain hazardous waste or, in the case of characteristic soil, no longer exhibited a hazardous characteristic.

3. Variance From the Soil Treatment Standards at Risk-Based Levels

EPA has long indicated that its preference would be to establish a complete set of risk-based land disposal treatment standards at levels that minimize short- and long-term threats to human health and the environment. See, for example, 55 FR at 6641 (Feb. 26, 1990). However, the difficulties involved in establishing risk-based standards on a nationwide basis are formidable due in large part to the wide variety of site-specific physical and chemical compositions encountered in the field and the uncertainties involved in evaluating long-term threats posed by land disposal. *Id.*; 60 FR 66380—66081 (Dec. 21, 1995). For these reasons the Agency has chosen to establish land disposal restriction treatment standards based on the performance of specific treatment technologies. Although technology-based treatment standards are permissible, they may not be established at levels more stringent than those necessary to minimize short and long-term threats to human health and the environment. Hazardous Waste Treatment Council, 886 F. 2d at 362 (land disposal restriction treatment standards may not be established, ''beyond the point at which there is not a ''threat'' to human health or the environment'').

While using risk-based approaches to determine when threats are minimized on a national basis has proven extremely difficult, these difficulties will diminish when evaluating risks posed by a specific contaminated soil in a particular remediation setting since, during remediation, one typically has detailed site-specific information on constituents of concern, potential human and environmental receptors, and potential routes of exposure. For this reason, EPA is establishing a site-specific variance from the technology-based soil treatment standards, which can be used when treatment to concentrations of hazardous constituents greater (i.e., higher) than those specified in the soil treatment standards minimizes 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 supersede the technology-based soil treatment standards. This approach was first discussed in the September 14, 1993 proposal, where EPA proposed that determinations that contaminated soil did not or no longer contained hazardous waste could supersede LDR treatment standards, if the ''contained-in'' level also constituted a ''minimized threat'' level. It was repeated in the April 29, 1996 proposal where the Agency proposed that, in certain circumstances, variances from land disposal restriction treatment standards could be approved in situations where concentrations higher than the treatment standards minimized threats.[18] 58 FR at 48128 (September 14, 1993) and 61 FR at 18811 and 18812 (April 29, 1996).

At this time, EPA is allowing the risk-based variances only for contaminated soils. The Agency believes this limitation is appropriate for a number of reasons. First, contaminated soils are most often generated during agency overseen cleanups, such as CERCLA cleanups, RCRA corrective actions or state overseen cleanups. This type of involvement in cleanups positions EPA and authorized states to appropriately consider site-specific, risk-based issues. Second, during remediation, experts and field personnel typically gather detailed site-specific information on risks posed by specific hazardous constituents or combinations of hazardous constituents, potential direct and indirect exposure routes, risk pathways and human and environmental receptors. Through application of this information, overseeing agencies can eliminate many of the long-term uncertainties associated with land disposal and, therefore, make appropriate risk-based decisions regarding the extent of treatment needed to minimize short- and long-term threats to human health and the environment from any given hazardous constituent or combination of hazardous constituents. EPA and state officials already routinely make these types of decisions when developing site-specific, risk-based cleanup levels and when making decisions about whether any given contaminated medium contains hazardous waste.[19] After experience implementing the site-specific minimize threat variance for contaminated soil, the Agency may consider extending it to other environmental media and remediation wastes.

Some commenters expressed concern that allowing site-specific, risk-based minimize threat determinations would abrogate the Agency's responsibilities under RCRA Section 3004(m). The Agency strongly disagrees. RCRA Section 3004(m) requires EPA to establish ''levels or methods of treatment, if any. * * *.'' In the case of contaminated soil, EPA is establishing those levels today based on the performance of available, appropriate soil treatment technologies. Providing a variance process to modify a level or method of treatment on a case-by-case basis reduces the likelihood that in any particular situation technology-based treatment standards will result in treatment beyond the point at which threats are minimized. The Agency is requiring that minimize threat variance determinations for contaminated soils be evaluated using the existing site-specific variance process set out in 40 CFR 268.44(h). EPA recently added language to this provision to clarify that variances cannot be approved without opportunity for public participation, including notice by appropriate means, opportunity for public comment and adequate explanation of an ultimate determination. 62 FR at 64507 (Dec. 5, 1997).

While not required, EPA anticipates that decisions about site-specific minimize threat decisions variances will often be combined with decisions that soil no longer contains hazardous waste. As discussed later in today's preamble, Agency guidance on ''contained-in'' determinations is essentially the same as the requirements for site-specific, risk-based minimize threat determinations promulgated today. For that reason, EPA believes it will always be appropriate to combine a contained-in determination with a site-specific, risk-based minimize threat variance. In these cases, EPA encourages program implementors and facility owners/operators to include information about the ''contained-in'' decision in the public notice of the site-specific minimize threat variance. In cases where a site-specific minimize threat variance is combined with a decision that a soil no longer contains hazardous waste, once treated to comply with the treatment standard imposed by the variance, the soil would no longer have any obligations under RCRA Subtitle C and could be managed—including land disposed—without further control under RCRA Subtitle C. The contained-in policy is discussed in more detail in Section VII.B.8 and Section VII.E of today's preamble.

EPA reminds program implementors that, consistent with the rest of the land disposal restriction program, site-specific determinations that threats are minimized cannot be based on the potential safety of land disposal units, or engineered structures such as liners, caps, slurry walls or any other practice occurring after land disposal. American Petroleum Inst. v. EPA, 906 F.2d 729, 735–36 (D.C. Cir. 1990) (land treatment cannot be considered in determining whether threats posed by land disposal have been minimized because land treatment is a type of land disposal and section 3004(m) requires that threats be minimized before land disposal occurs); see also S. Rep. No. 284, 98th Cong. 1st sess. at 15, stating that engineered barriers cannot be considered in assessing no-migration variances because ''[a]rtificial barriers do not provide the assurances necessary to meet the standard.'' This means that site-specific minimize threat determinations must be based on the inherent threats any given contaminated soil would pose. The Agency recognizes that this will have the effect of precluding site-specific minimize threat variances for remedies that rely, even in part, on capping, containment or other physical or institutional controls. In

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[18] In the April 29, 1996 proposal, the Agency proposed to limit variances based on a site-specific minimize threat determination to contaminated soils where all concentrations of hazardous constituents were below a ''bright line,'' that is, below a certain risk level. The Agency also requested comment on extending site-specific minimize threat variances to other contaminated soils. Based on further consideration and consideration of comments, the Agency is persuaded that a site-specific minimize threat variance should be available to all contaminated soils. The Agency believes this is proper because the outcome of a site-specific, risk-based minimize threat variance—alternative, site-specific LDR treatment standards based on risk—will be the same regardless of the initial concentrations of hazardous constituents. In any case, the Agency is not, at this time, taking action on the portion of the April 29, 1996 proposal that would have established a ''bright line'' to distinguish between higher- and lower-risk media. If, in the future, the Agency takes action to establish a bright line, it will address the relationship of a bright line to site-specific minimize threat variances.

[19] While not forbidden, the Agency believes that site-specific, risk-based minimize threat determinations will rarely be made in the context of an independent or voluntary cleanup action, since, in these types of actions, an overseeing Agency will not, typically, have been involved in the identification exposure pathways and receptors of concern or the calculation of site-specific, risk-based cleanup levels. Of course, generators could apply for a site-specific, risk-based minimize threat variance during an independent or voluntary cleanup and, provided EPA or an authorized state agreed that the proposed alternative treatment standards minimized threats considering appropriate exposure pathways and receptors, a variance could be approved.

addition to being compelled by the statute, the Agency believes this approach is proper, in that it may encourage remedy choices that rely more predominantly on treatment to permanently and significantly reduce the concentrations (or mobility) of hazardous constituents in contaminated soil. The Agency has a strong and longstanding preference for these types of more permanent remedial approaches.

In addition, at a minimum, alternative land disposal restriction treatment standards established through site specific, risk-based minimize threat variances should be within the range of values the Agency generally finds acceptable for risk-based cleanup levels. That is, for carcinogens, alternative treatment standards should ensure constituent concentrations that result in the total excess risk from any medium to an individual exposed over a lifetime generally falling within a range from 10^{-4} to 10^{-6}, using 10^{-6} as a point of departure and with a preference, all things being equal, for achieving the more protective end of the risk range. For non-carcinogenic effects, alternative treatment standards should ensure constituent concentrations that an individual could be exposed to on a daily basis without appreciable risk of deleterious effect during a lifetime; in general, the hazard index should not exceed one (1). Constituent concentrations that achieve these levels should be calculated based on a reasonable maximum exposure scenario—that is, based on an analysis of both the current and reasonably expected future land uses, with exposure parameters chosen based on a reasonable assessment of the maximum exposure that might occur. The Agency believes these represent an appropriate range of minimum values for site-specific, risk-based minimize threat determinations because sites cleaned up to these levels are typically released from regulatory control under the Federal CERCLA program and the RCRA corrective action program. See, for example, the National Contingency Plan (55 FR 8666, March 8, 1990) the 1990 RCRA Corrective Action Subpart S Proposal (55 FR 30798, July 27, 1990), and the 1996 RCRA Corrective Action Subpart S ANPR (61 FR 19432, May 1, 1996). In addition to achieving protection of human health, alternative treatment standards must ensure that environmental receptors are protected and must also ensure that no unacceptable transfer of contamination from one medium to another, for example, from soil to ground water, will occur.[20] Protection of environmental receptors and against cross-media contamination may, in some cases, require more stringent (i.e., lower) alternative treatment standards than would be necessary to protect human health alone. The Agency recognizes that this approach is different from the approach used in developing national risk-based minimize threat levels proposed in the Hazardous Waste Identification Rule (HWIR-Waste). 60 FR 66344 (December 21, 1995). This difference is proper, in that the HWIR-Waste proposal contemplated nationally-applicable risk-based LDR treatment standards and, therefore, had to consider the myriad of potential exposure pathways and receptors which might occur at any given site, nation wide. A site-specific minimize threat determination is informed by actual and reasonable potential exposure pathways and receptors at a specific land disposal location.

Although not expressly limited to land disposal of contaminated soil on-site, EPA anticipates that site-specific minimize threat variances will, most often, be applied to these activities. The basis for developing an alternative land disposal restriction treatment standard during the site-specific minimize threat variance is application of risk information about specific exposure pathways and receptors of concern. To apply such a variance to off-site land disposal, the treatment standard would have to be informed by the exposure pathways and receptors present at the off-site land disposal areas (assuming no physical or engineered structures or other post-land-disposal controls). While such an analysis is allowed, this information is not, to the Agency's knowledge, routinely gathered during site remediation.

Most commenters supported the concept of using a treatment variance to reduce the likelihood that, in any particular case, technology-based soil treatment standards might prompt treatment beyond the point at which threats to human health and the environment are minimized.

One commenter was concerned that establishing a risk-based minimize threat variance without adequate minimum standards would be contrary to law and impossible to oversee. EPA was, in part, persuaded by these comments and has added a requirement that, at a minimum, alternative LDR treatment standards approved through a site-specific minimize threat variance be within the range of acceptable values the Agency typically uses for cleanup decisions, as discussed above. In addition, as discussed above, the Agency has clarified that, unlike some CERCLA or RCRA corrective action remedies, site-specific minimize threat variances may not rely on post-land disposal controls.

4. Constituents Subject to Treatment

For soil contaminated by listed hazardous waste, EPA proposed that treatment would be required for each hazardous constituent originating from the contaminating waste. For soil which exhibits (or exhibited) a characteristic of hazardous waste, EPA proposed that treatment would be required: (1) in the case of TC soil, for the characteristic contaminant; (2) in the case of ignitable, reactive or corrosive soil, for the characteristic property; and, (3) in both cases, for all underlying hazardous constituents. 61 FR at 18809 (April 29, 1996). Under the 1996 proposal, treatment would have been required only when those constituents were initially present at concentrations greater than ten times the universal treatment standard. EPA also requested comment on, among other things, whether, for soil contaminated by listed hazardous waste, treatment should be required for all underlying hazardous constituents present at concentrations above ten times the UTS. Underlying hazardous constituent is defined in 40 CFR 268.2(i) as, ''any constituent listed in 40 CFR 268.48 table UTS, except fluoride, sulfides, vanadium, selenium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste, at a concentration above the constituent-specific UTS treatment standards.''

Many commenters supported the proposed approach. Some commenters, however, expressed concern that, because contaminated soil often contains numerous hazardous constituents from a variety of sources, limiting treatment of soil contaminated by listed hazardous waste to constituents originating from the contaminating waste might result in soil contaminated with listed waste undergoing less treatment than soil which exhibits (or exhibited) a characteristic of hazardous waste. One commenter also asserted that the proposed approach to constituents subject to treatment was, in the case of soil contaminated by listed hazardous waste, inconsistent with the Chemical Waste opinion. On further consideration, EPA was persuaded that it is prudent to apply the logic of the

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[20] Unacceptable cross-media transfer would include, for example, transfer of contaminants from soil to air in excess of applicable air emission standards.

Chemical Waste opinion both to soil contaminated by listed hazardous waste and to soils which exhibit a characteristic of hazardous waste.

As the Agency explained in the 1996 proposal, contaminated soils are potentially contaminated with a wider range of hazardous constituents than most pure hazardous wastes generated by on-going industrial processes—in no small part because contaminated soils generally reflect uncontrolled disposal settings. 58 FR at 48124 (September 14, 1993). Since the Chemical Waste opinion addressed a similar situation (certain characteristic hazardous wastes that might contain a variety of hazardous constituents), the Agency is persuaded that it is prudent to apply the logic of the Chemical Waste opinion to contaminated soil and require treatment of all underlying hazardous constituents. See Chemical Waste Management v. US EPA, 976 F.2d at 16–18 (D.C. Cir 1992). Therefore, when the soil treatment standards are used, today's final rule requires that all contaminated soil subject to the LDRs be treated to achieve the soil treatment standards for each underlying hazardous constituent reasonably expected to be present in the soil when such constituents are initially found at concentrations greater than ten times the universal treatment standard. In addition to treatment of all underlying hazardous constituents as discussed above, as proposed, characteristic soil must also be treated, in the case of TC soil, for the TC constituent and, in the case of ignitable, corrosive, or reactive soil, for the characteristic property.

Although, when the soil treatment standards are used, treatment is now required for each underlying hazardous constituent when such constituents are initially found at concentrations greater than ten times the universal treatment standard, it will not be necessary to monitor soil for the entire list of underlying hazardous constituents. Generators of contaminated soil can reasonably apply knowledge of the likely contaminants present and use that knowledge to select appropriate underlying hazardous constituents, or classes of constituents, for monitoring. This is consistent with the approaches EPA typically takes in remedial programs, where it emphasizes that remediation managers should focus investigations on constituents of concern and with regulations that allow generators to rely on knowledge to determine whether any given solid waste is hazardous. *Cf.* 61 FR at 19444 where EPA encouraged remediation managers to ''tailor [facility investigations] to the specific conditions and circumstances at the facility and focus on the units, releases, and exposure pathways of concern.''

For nonanalyzable constituents, EPA is promulgating the approach discussed in both the September 14, 1993 and the April 29, 1996 proposals. In situations where contaminated soil contains both analyzable and nonanalyzable organic constituents, treating the analyzable constituents to meet the soil treatment standards is also reasonably expected to provide adequate treatment of the nonanalyzable constituents. In situations where contaminated soil contains only nonanalyzable constituents (i.e., soil contaminated only by nonanalyzable U or P listed wastes), treatment using the specified method for the appropriate U or P listed waste is required. 61 FR at 18810, April 29, 1996. Most commenters supported this approach.

5. Relationship of Soil Treatment Standards to Naturally Occurring Constituents

In the April 29, 1996 proposal EPA requested comment on whether concentrations of naturally occurring constituents should be evaluated when identifying constituents subject to treatment. Commenters who addressed this issue overwhelmingly recommended that, for naturally occurring constituents, EPA cap LDR treatment requirements for soil at natural background concentrations. After considering these comments, EPA was persuaded that treatment to comply with LDRs should not be required if constituent concentrations fall below naturally occurring background concentrations, provided the soil will continue to be managed on site or in an area with similar natural background concentrations. If soil will be sent for land disposal off-site, compliance with LDRs is required, since the Agency believes that natural background concentrations on-site will not automatically correspond to natural background concentrations at a remote land disposal facility.

The Agency notes that, for purposes of this discussion, natural background concentrations are constituent concentrations that are present in soil which has not been influenced by human activities or releases. Since these constituent concentrations are present absent human influence and EPA has determined that soil (like other environmental media) is not, of itself, a waste but may be regulated as hazardous waste under RCRA only when it contains (or contained) waste, EPA is not convinced the Agency would have the authority to require compliance with LDRs when constituent concentrations fall below background concentrations even if it felt compelled to do so. (Of course, such constituents could be regulated as hazardous constituents under state and Federal cleanup authorities, including RCRA corrective action and other authorities.)

Since natural background concentrations may vary across geographic areas, and to ensure that LDRs will only be capped at background where appropriate, EPA will require that individuals who wish to cap LDR treatment at natural background concentrations apply for and receive a treatment variance. EPA will presume that when LDRs would require treatment to concentrations that are less than natural background, such a variance will be appropriate, based on the finding that it is inappropriate, for contaminated soil, to require treatment to concentrations less than natural background concentrations. This issue has been clarified in today's final regulations, see 40 CFR 268.44(h)(4).

6. Restrictions on Use of Treated Hazardous Contaminated Soil in Products Used in a Manner Constituting Disposal

Although, as discussed earlier in today's preamble, EPA believes the soil treatment standards satisfy the requirements of RCRA Section 3004(m), EPA has determined that additional restrictions are necessary for hazardous contaminated soils that are used to produce products which are, subsequently, used in a manner constituting disposal (i.e., used to produce products which are placed in or on the land). Under current regulations, hazardous waste-derived products that are used in a manner constituting disposal must, among other things, comply with the applicable land disposal restriction treatment standards in 40 CFR part 268.40, that is, the Universal Treatment Standards. See 40 CFR 266.23(a). EPA has concluded that hazardous contaminated soil used to produce products which are, subsequently, used in a manner constituting disposal must continue to meet the universal treatment standards. Such products, then, are not eligible for the soil treatment standards promulgated today. EPA has made this decision for several reasons. First, EPA has chosen technology-based treatment standards (such as today's soil treatment standards) as a means of implementing the LDR statutory requirements in order to eliminate as many of the uncertainties associated with land disposal of hazardous waste as possible.

55 FR at 6642 (Feb. 26, 1990). These uncertainties increase sharply when one considers possible dispositions of hazardous waste-derived products used in a manner constituting disposal. These products can be placed virtually anywhere, compounding potential release mechanisms, exposure pathways, and human and environmental receptors. 62 FR at 64506 (Dec. 5, 1997) and 53 FR at 31197–98 (August 17, 1988). For these reasons, the Agency in 1988 determined that these wastes should be treated to reflect the best treatment available, 53 FR at 31197–98, and the Agency believes this reasoning continues to hold with respect to contaminated soils. Second, EPA has determined that the soil treatment standards adopted in today's rule are justified, in many instances, in order to encourage remediation involving treatment over remedies that involve leaving un-treated contaminated soils in place. The Agency is less sure that this is a desirable incentive if the contaminated soils are to be used in a manner constituting disposal, again because of the uncertainties posed by this method of land disposal.

Note that EPA has explained, however, that remediation activities involving replacement of treated soils onto the land is not a type of use constituting disposal, in part, because it is a supervised remediation instead of an unsupervised recycling activity. 62 FR 26063 (May 12, 1997). This interpretation is not affected by today's rulemaking.

7. Availability of Soil Treatment Standards

EPA proposed that soil-specific land disposal restriction treatment standards would be available only for contaminated soils managed under an agency approved, site-specific cleanup plan termed a Remediation Management Plan or ''RMP.'' The Agency also specifically requested comment on whether soil-specific treatment standards should be made available to all contaminated soil. 61 FR at 18813 (April 29, 1996). The majority of commenters who addressed this issue strongly supported extending the soil treatment standards to all contaminated soil. These commenters argued that extending soil-specific LDRs to all contaminated soil would encourage voluntary and independent cleanups, especially at low and medium priority sites where a regulatory agency might not have the resources to provide real-time oversight through a ''RMP.'' After considering these comments, EPA is persuaded that the soil treatment standards should be available for all contaminated soil and has revised the regulations accordingly.

EPA's thinking in proposing to require a site-specific remediation management plan to take advantage of the soil treatment standards was that site-specific oversight, and potentially modification of the treatment standards, would be necessary to ensure that all contaminated soils were appropriately treated. 61 FR at 18807 (April 29, 1996). However, EPA now concludes that the soil treatment standards will ensure adequate treatment of all contaminated soils for two reasons.

First and primarily, the residuals from treatment of hazardous contaminated soil will typically continue to be regulated as hazardous waste and will remain subject to applicable RCRA Subtitle C requirements. 61 FR at 18810 (April 29, 1996). Non-soil residuals, such as wastes generated during application of separation technologies, will be regulated as hazardous wastes if they exhibit a characteristic of hazardous waste or if they derive from treating a soil which contains listed hazardous waste. Therefore, these types of non-soil residuals will typically be subject to the universal treatment standards in 40 CFR 268.40. See 57 FR at 37240 (Aug. 18, 1992) where EPA took the same approach for residues from treating contaminated debris. Soil residuals will also be regulated as hazardous waste unless it is determined that the soil does not contain hazardous waste.[21] For example, application of a thermal desorption technology would likely generate two types of residuals: treated soil (soil residual) and concentrated contaminants removed from the soil and captured in an air pollution control device (non-soil residual). If the contaminated soil contained a listed hazardous waste or exhibited a characteristic of hazardous waste at the time of treatment, both residuals would continue to be subject to RCRA Subtitle C regulations. The non-soil residual would be required to comply with applicable universal treatment standards prior to land disposal; the soil residual would generally require land disposal in a Subtitle C unit unless a ''contained-in'' determination was made. Therefore, although a remediation management plan is no longer required to take advantage of the soil treatment standards, a site-specific decision is still required before treated contaminated soil can exit the system of RCRA regulations.

Second, as noted earlier, EPA has extended the treatment requirement to all underlying hazardous constituents reasonably expected to be present in contaminated soils when such constituents are found at initial concentrations greater than ten times the universal treatment standard and retained current treatment requirements for hazardous contaminated soils used to produce products that are subsequently used in a manner constituting disposal.

8. Achievability of Contaminated Soil Treatment Standards

The soil treatment standards promulgated today are based primarily on the data for soil treatability found in EPA's Soil Treatment Database (SDB). See, Best Demonstrated Available Treatment Background Document for Hazardous Soils, August 1993 and LDR Phase 2 proposal at 58 FR 48122, Sept. 14, 1993. Data from the soil treatment database are corroborated by more recent performance data for non-combustion treatment of remediation wastes. See Soil Treatability Analysis: Analysis of Treatability Data for Contaminated Soil Treatment Technologies (April 1998, USEPA) and references cited in note 5 below.

The soil treatment data base contains 6,394 pairs of data points (for the same sample, one datum for untreated soil and one datum for treated soil) describing the treatment of hazardous constituents in contaminated soils managed under the RCRA and the Superfund programs. After screening the database to eliminate data from tests reflecting poorly designed or operated treatment, tests where EPA believes inappropriate technologies were applied (for example, data from immobilization of organic constituents) and other inappropriate data, the Agency was left with 2,541 pairs of data points. These data pairs depict treatment of ninety-four hazardous constituents, including eighty-five organic constituents and nine BDAT list metals. The retained 2,541 pairs of data points from the soil treatment database represent the treatment of organic and metal constituents by various technologies including: combustion, biological treatment, chemical/solvent extraction, dechlorination, thermal desorption, air/steam extraction, photolysis, soil washing, stabilization, and vitrification. The soil treatment database includes performance data from bench, pilot, and full scale technologies. A complete discussion of the Agency's method for

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[21] The exception would be soil residuals from treatment of soils which were determined no longer to contain a listed hazardous waste or were decharacterized and yet remained subject to LDRs. In this case, since the treatment would be performed on non-hazardous soil, the soil residuals would also be considered non-hazardous.

screening the Soil Treatment Database can be found in the LDR Phase II proposal (58 FR 48129–31, September 14, 1993) and the Best Demonstrated Available Technology Background Document for Hazardous Soil (August 1993).

A number of commenters were concerned that aggregated data, i.e., the 2,541 pairs of data points representing the combined performance of combustion and non-combustion technologies, may mask the performance of non-combustion technologies alone. Commenters urged EPA to disaggregate these performance data to allow for more accurate analysis of non-combustion technology performance. As a result, EPA has disaggregated the combustion and non-combustion treatment data for purposes of analyzing the achievability of today's soil treatment standards. See generally, Soil Data Analysis: Soil Treatability Analysis of Treatability Data for Contaminated Soil Treatment Technologies (April 1998, USEPA) and Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble (April 1998, USEPA).

After separating out combustion data, the remaining non-combustion soil treatment data base is reduced from 2,541 to 2,143 paired data points. These 2,143[22] data pairs depict the treatment of 72 organics[23] and nine metals in contaminated by biological treatment, chemical and solvent extraction, dechlorination, thermal desorption, air and steam stripping, hydrolysis, photolysis, soil washing, and stabilization.

As discussed earlier in today's preamble, EPA did not use the traditional BDAT approach to develop the soil treatment standards. Instead, the Agency evaluated data from the 2,143 non-combustion data pairs in the soil treatment database to identify, generally, the level of performance non-combustion soil treatment technologies achieve. In light of our multi-faceted objectives regarding remediation of contaminated soils (discussed earlier in this preamble), this approach and methodology are appropriate. As noted earlier in today's preamble, the numerical values chosen for soil treatment standards—90% reduction capped at ten times the UTS—are within the zone of reasonable values from which the Agency can properly select.

For soil contaminated with organic constituents, the retained 2,143 data pairs from the soil treatment database show generally that soils with moderate levels of contamination are more amenable to treatment by non-combustion technologies than soils with high levels of contamination. However, the data also show that the soil treatment standards promulgated today can be achieved by non-combustion technologies even in cases when soils contain elevated levels of harder-to-treat organic hazardous constituents, such as dioxins and furans, polychlorinated biphenyls (PCBs), and polynuclear aromatics (PNAs). The available data on the performance of non-combustion technologies suggest that some technologies are more effective with certain organics within specific families or chemical functional groups. For example, while many organic treatment technologies were effective in removing volatile organics from the soils, dechlorination is more effective than other non-combustion treatment technologies for treating chlorinated organics. For soil contaminated by metals, the retained 2,143 data points from the soil treatment database show that metals can typically be treated via stabilization to meet the soil treatment standards.

Although, for the reasons discussed earlier in today's preamble, EPA has elected to base the soil treatment standards on the performance of non-combustion technologies, combustion of soil is not prohibited. This is consistent with all other numerical treatment standards, which can likewise be achieved through use of any technology (other than impermissible dilution). It may be that combustion is, in fact, chosen as the remedial treatment technology at certain sites, most likely because of economic considerations (such as in the case of low soil volumes where on-site treatment units are not economically viable). Selection of the best treatment technology for the specific soil type and range of contaminants present at any given remediation site is a site-specific decision assuming, for soils subject to the LDRs, that the selected technology does not involve impermissible dilution and that today's soil treatment standards are met. Further details about the results of EPA's examination of treatment technologies for different groups of contaminants are discussed in the succeeding sections.

a. Comments. Many commenters expressed concern that the retained 2,541 data points from the soil treatment database might not adequately address the many types of soils and contaminated site scenarios that may arise in the field. Among other things, these commenters asserted that: (1) the list of chemical organic constituents for which EPA has data may be too small to extrapolate to other organics in the list of underlying hazardous constituents that must meet treatment standards; (2) for organic constituents, many of the treatment test results examined by EPA involved mostly combustion rather than non-combustion technologies; (3) for soils with multiple hazardous constituents and other complex soil matrices, the soil treatment standards could only be met via incineration; and, (4) EPA should not pool data from bench, pilot, and full scale treatment applications. For the most part, these commenters suggested that EPA either exempt hazardous contaminated soil entirely from a duty to comply with land disposal restriction treatment standards or, if hazardous contaminated soil were to remain subject to LDRs, allow risk-based treatment standards to be developed entirely on a site-by-site basis pursuant to state oversight.

EPA closely considered these comments and carefully re-evaluated the data from the soil treatment database as well as other data from more recent sources. These evaluations are summarized in the background documents for today's final rule. EPA is not, at this time, taking action to categorically exempt large volumes of hazardous remediation waste (including contaminated soil) from RCRA hazardous waste management requirements and, therefore, the issue of achievability of today's soil treatment standards is germane.

Notwithstanding the treatment results described in this section below, which support the achievability of today's soil treatment standards, EPA realizes that national, technology-based treatment standards are sometimes not achievable because of site- and waste-specific characteristics. Thus, EPA has long provided for treatment variances under these circumstances (see 40 CFR 268.44). In addition, because EPA and authorized states are in a position during remediation to make site-specific risk-based minimize threat determinations, the Agency is also adopting in today's rule a new type of variance for contaminated soils. This variance can be granted if, on a case-by-case basis, it is determined that the technology-based treatment standard

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[22] One single datum from the vitrification of p,p'DDT was not included since it appears to have resulted from treatment that was not optimally designed or conducted.

[23] Out of 85 organic constituents, only 13 were treated exclusively by combustion. See, however, the discussion later in this preamble with regard to presence of data from incineration and extrapolation of data among organic constituents.

would prompt treatment beyond the point at which threats are minimized.

Fundamentally, EPA agrees with many commenters that today's land disposal treatment standards for contaminated soil may not remove all of the barriers RCRA can impose on efficient and aggressive site remediation. As discussed earlier in today's preamble, the Agency hopes the application of RCRA Subtitle C requirements to remediation of contaminated soils and other wastes will be addressed through legislation. If there is no legislative action, EPA may choose to take additional regulatory action, which may include either a re-examination of the application of LDRs to contaminated soil or other remediation wastes or a re-evaluation of today's soil treatment standards, or both. In the meantime, today's rule represents a significant improvement over the current practice of applying the treatment standards developed for pure industrial hazardous waste to contaminated soil.

b. Analysis of Data from the Soil Treatment Database. The soil treatment standards promulgated today are based EPA's Soil Treatment Database (SDB). See, Best Demonstrated Available Treatment Background Document for Hazardous Soils (August 1993); LDR Phase 2 proposal (58 FR 48122, Sept. 14, 1993); and Soil Treatability Analysis: Analysis of Treatability Data for Contaminated Soil Treatment Technologies (April 1998, USEPA) (hereinafter, this document is referred to as the ''Soil Treatability Analysis Report''). General concerns about the soil treatment database (and in particular, concerns about achieving the 10 times UTS or 90% reduction standard) are addressed here. Results of our analysis of the soil treatment database data on treatment performance for various technologies are shown in Table 1 below. Results of additional analysis for various organic and metal contaminant groups are shown in Tables 2–5 below. Further details of the analysis and additional findings are contained in the technical background documents in this docket.

TABLE 1.—SUMMARY OF TREATMENT RESULTS PER TECHNOLOGY IN SOIL DATA BASE[24]

Treatment technology	Total paired data points in the soil data base	Untreated	Treated			
		Data points meeting 10 times UTS standard	Data points meeting 10 times UTS but not 90% reduction standard	Data points meeting 90% reduction but not 10 times UTS standard	Data points meeting both 10 times UTS and 90% reduction standards	Data Points failing both 10 times UTS and 90% reduction standards
Biological Treatment	250	86	176	168	109	15
Chemical Treatment	242	58	226	206	200	10
Dechlorination	154	53	134	100	84	4
Stabilization	269	140	250	239	232	12
Stripping	236	88	206	103	103	30
Washing	35	10	21	14	11	11
Thermal Desorption	957	338	833	759	692	57
Total	2143[25]	773	1846	1589	1431	139

In aggregate, the results on Table 1 indicate that the Agency's selection of standards are within the range of reasonable values for non-combustion technologies to achieve. These data show that 139 (or 6%) paired data points out of 2143 would fail to meet the 10 times UTS or 90% reduction standard. Among possible reasons for these treatment performance deviations are that some soil samples represent cases in which the selected technology was not appropriate for the range of hazardous constituents in an organic chemical admixture. A better selection of treatment technology may include either a more aggressive non-combustion technology or may involve use of two or more technology trains in order to meet the soil treatment standards. It is common practice to employ multiple treatment trains at facilities that have complex chemical mixtures or soil textures at a site. As further explained in succeeding sections of this preamble and in various background documents, EPA believes that the hazardous soil treatment standards promulgated today are within a regime of reasonable treatment levels normally achieved by non-combustion technologies. See, e.g., Soil Treatability Analysis Report and Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA).

(1) Concerns About Presence of Data from Incineration and Extrapolation of Data to Other Constituents. As mentioned earlier, EPA has segregated the available treatment data (2,541 paired data points) so that we can better examine the 2,143 paired data points describing the treatment of hazardous soils by non-combustion technologies. Although 50 organic constituents in the original 2,541 paired data points were treated by combustion (i.e., incineration), only 13 of these 50 organics were treated exclusively by combustion. These 13 hazardous constituents are: 1,2,4-trichlorobenzene; p,p′-DDD; p,p′DDE; 2,4-dichlorophenol; methoxychlor; 2,4,6-trichlorophenol; 2,4,5-trichlorophenol; carbon tetrachloride; chloroform; hexachloroethane; 1,2-dibromo-3-chloro-propane; isodrin; and gamma-BHC. None of the data describing combustion of these 13 constituents or the other 37 organics (for which there are some combustion results) were relied upon in assessing achievability of today's hazardous soil treatment limits.

With respect to commenters' concerns about extrapolating the SDB data to organic and inorganic constituents that will need to be treated, EPA analyzed the various non-combustion technologies and their average treatment efficiencies against various chemical clusters and chemical functional groups of hazardous constituents. See: (1) Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); (2) Derivation of Treatment Achievability Results of Organic Functional Groups and Types of Compounds (April 1998, USEPA); (3) Soil Treatability Analysis Report (USEPA, 1998); and (4) Additional

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[24] For discussion of these treatment data, see Soil Treatability Analysis Report, and Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA).

[25] As noted earlier, EPA examined in detail up to 2,541 pairs of data points in total, and the number of non-combustion data pairs examined is 2,143.

Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of the Final Rule Preamble (April 1998, USEPA).

The results are summarized in Tables 2–5 below. These results show that non-combustion technologies can achieve today's soil treatment standards. 93.5% (2,004 of the 2,143 data pairs) of the treatment test results meet the 10 times UTS or 90% reduction standard. Furthermore, non-combustion technologies can meet the soil treatment standards even in cases when soils contain elevated levels of harder-to-treat organic hazardous constituents, such as dioxins and furans, polychlorinated biphenyls (PCBs), and polynuclear aromatics (PNAs). See Appendix D in Soil Treatability Analysis Report.

As noted earlier, available data on the performance of non-combustion technologies treating organics also show that some technologies are more effective with certain organics within specific families or chemical functional groups, e.g., organic treatment technologies removing volatile organics from the soils and dechlorination removing halogenated organics. Treatability tests at certain complex sites corroborate these findings of achievability from the SDB.

Regarding organics, at the Ninth Avenue Dump Site in Indiana, hazardous soils were contaminated with low to moderate concentrations of PNAs, aromatics, chlorinated aliphatics, and phthalates. Untreated constituents showed concentrations that were about the same or up to two orders of magnitude higher than today's soil treatment standards.[26] Among the volatiles were toluene (1,100 ppm), total xylene (2,100 ppm), ethylbenzene (420 ppm), 1,1,1-trichloroethane (120 ppm), trichloroethene (93 ppm), tetrachloroethene (380 ppm), 1,1-dichloroethane (81 ppm), and methylene chloride (800 ppm). The following semivolatile organics-PNAs (and their highest concentration) were phenanthrene (92 ppm) and naphthalene (84 ppm). Bis(2-ethylhexyl) phthalate, a semivolatile phthalate, was reported at 110 ppm. The soil particle distribution of the contaminated soil was not quantified, but the soil was reported as comprised primarily of sand and silt. Biotreatment achieved the following average treatment reduction efficiencies:

- Volatile chlorinated aliphatics—99.9%;
- Ethylbenzene—100%;
- Volatile aromatics—99.9%;
- Semivolatile PNAs—97.4%;
- Bis(2-ethylhexyl)phthalate—93.2%.

Regarding complex metal remediations, the full-scale stabilization study conducted at the Portable Equipment Salvage Company, a transformer and metal salvage operation in Oregon, involved untreated levels of lead up to 880 mg/l (TCLP) and zinc up to 71 mg/l (TCLP). Organics were also present—the highest sample showing 610 mg/l lead (TCLP), 14,000 ppm oil and grease, 41,000 ppm total organic carbon, and 7.1 pH. The facility conducted treatability studies on three soil textures found at the site: (1) sandy loam, (2) loamy sand, and (3) loam. The stabilized sandy loam sample showed a concentration of 0.5 ppm lead, a 99.72% reduction efficiency. The facility also treated two samples of loamy sand, one to 47 mg/l lead (TCLP) (a 93.65% reduction efficiency) and the other to 2.5 mg/l lead (TCLP) (a 99.72% reduction efficiency). The treated loam sample showed 0.10 mg/l lead, a 99.97% reduction.

More information underlying EPA's rationale for extrapolating the available treatment performance data to other organic and inorganic hazardous constituents regulated under the land disposal restrictions can be found in the RCRA Docket for this rule (see Appendix D in Soil Treatability Analysis Report) and memorandum to docket on extrapolation of treatment performance data among different hazardous constituents.

Finally, we note that even though there were treatment data on soils containing cyanide in the larger data base (6,394 paired data points), none of the retained 2,541 or 2,143 paired data points included treatment data on cyanide. However, the current UTS for cyanide is based on the performance of alkaline dechlorination, a non-combustion technology. Cyanides can form complexes with metals and organics and, therefore, technologies capable of removing both organic and metals are also able to remove cyanide from contaminated soils. As a result, it is reasonable to expect that the average treatment performance attained by treating organics in soils will also be achieved for cyanide-bearing contaminated soils. We note that, for example, 90% reduction can be achieved based on the performance efficiency that thermal desorption attained in removing PNA's (with more than five rings) and chlorinated organics from contaminated soil. These constituents are among the hardest chemical species to remove via thermal desorption. For these reasons, the Agency has concluded that today's soil treatment standard for cyanide can be achieved by a non-combustion technology as well.

(2) Technology Scale and Soil Variability Issues. As noted earlier, several commenters objected to EPA's pooling of treatment data from pilot, bench, and full scale processes, and urged EPA to consider only performance data from full-scale field studies characterizing the treatment of soil volumes. EPA prefers, generally, to rely on full scale studies for the purpose of developing and promulgating treatment standards, and this is true with respect to the soil treatment standards as well. However, in this case as well as in many prior LDR treatment standard efforts, EPA's data base includes more than just full scale data upon which EPA can properly rely. Bench and pilot scale technologies can be appropriately considered by EPA (and EPA has historically done so) in setting treatment limits as long as full scale operations of the treatment system under consideration exist or have been demonstrated on wastes/soils. Except for hydrolysis,[27] the technologies in the SDB are demonstrated full scale, and the administrative docket contains bench, pilot, and full scale studies that reflect the Agency's field experiences at contaminated sites.

Furthermore, in this rulemaking, given the variability of hazardous soils (in terms of types, concentrations and numbers of hazardous constituents and soil matrices), plus the special policy considerations associated with remediations, the Agency is adopting treatment standards from the zone of reasonable values that could be permissibly selected based upon the treatment performance data. Thus, the data are not being used so much to establish a precise performance level as to confirm the typical achievability of the promulgated standards, i.e., ten times UTS or 90% reduction.

With respect to the SDB and commenters' concerns about the impact of soil variability on achievability of the soil treatment standards by non-combustion technologies, EPA collected 6,394 pairs of data point describing the treatment of various hazardous soils.

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[26] The following constituents were present at levels below the soil treatment standards; fluorene, fluoranthene, pyrene, acenaphthalene, benzo(a)anthracene, chrysene, di-n-butyl phthalate, and diphenylnitrosamine.

[27] Hydrolysis can be of normal occurrence or intentionally induced at hazardous waste sites. EPA does not have full-scale ex-situ demonstration studies on this technology but considers the data in the SDB to be indicative of what levels can be achieved.

The retained 2,143 non-combustion paired data points are reasonably sufficient to adequately describe the treatment of metal, organics, and multiple metal and organic contaminants that are frequently found at different type of sites, including both Superfund and RCRA sites. For instance, the SDB has treatment data on soils with varying textures including top soils, silty/loam soils, and clay soils. For the 14 different soil type groupings analyzed, only 139 out of 2,143 data pairs (about 6.5%) would not meet today's soil treatment standards (see Appendices C and D in Soil Treatability Analysis Report).

With respect to these 6.5% data pairs, several potential reasons exist to explain why 90 % reduction or 10 times UTS level might not have been achieved. First, the treatment study objectives may not primarily have been to test whether these standards could be met. For example, the treatment study may have been designed either to assess the feasibility of using a particular (but not necessarily optimum) technology on a particular contaminated soil, or to meet a prescribed risk-based level under a RCRA or CERCLA site remediation plan.

Second, a treatment technology may have been applied to soils contaminated with multiple hazardous constituents where the technology may have been inappropriate for a subset of those contaminants (and for which data were reported anyway). For example, air stripping is a technology that operates best on volatile organics within a given range of Henry constant values. In contrast, air stripping of semivolatile organics and metals is expected to be much poorer. (In this type of situation, a technology amendment or treatment train may be appropriate, i.e., air stripping may be improved if steam stripping is applied first to enhance the pool of semivolatiles that can respond to the physical separation treatment process.)

Third, these treatment data likely include instances when a treatment technology encountered soil heterogeneities that resulted in undertreatment of portions of the soil. For instance, during the clean up of contaminated debris and soils, detailed sampling protocols are typically developed to ensure that desired treatment constituent concentrations are met because of the deleterious impact of heterogeneous soil strata and the presence of debris on treatment technology performance. Re-processing can often be required to comply with the applicable treatment standards. Another alternative is to optimize specific technology operating parameters that can enhance the ability of the technology to meet the prescribed treatment limits. Optimization can involve: (1) feeding the correct soil/debris particle size fractions to the treatment system, (2) creating more turbulence between soil and gaseous/liquid treatment fluids, (3) using a greater-than-normal amount of chemical agents, (4) operating at the higher end of an operating temperature range, (5) adjusting the pH of the soil, (6) adding adequate pre-/post-treatment steps that address specific contaminants that may be expected to receive sub-optimal treatment, or (7) allowing longer residence time in the treatment unit.

It is not possible to determine precisely how many of these techniques were used in the 139 instances that failed the 90% reduction or 10 times UTS levels. However, EPA expects that not all optimization measures were used since the operators of the treatment technologies did not have as their primary objective the attainment of these particular levels, which are being adopted today as the soil treatment standard. On balance, the weight of evidence and analysis from the SDB are believed to reasonably indicate that today's standards are achievable for soils that may exhibit variability, particularly if optimization techniques or treatment technology trains are fully considered. Of course, should an unusual situation present itself in which these measures are not successful, a treatment variance can be sought under 40 CFR 268.44(h) or under the risk-based variance provisions being adopted in today's rule.

Furthermore, EPA has a number of bench and pilot studies on the treatment of contaminated soils from wood preserving, petroleum refining, and electroplating sites, which contain a wide range of constituents such as polynuclear aromatic, phenolic, chlorinated organics, spent solvents, creosote, and metals. It is reasonable to expect that these treatment results, showing achievability, also lend support to the conclusion that treatment at other RCRA and Superfund sites, containing these types of complex contaminant and soil variability scenarios, can be expected to achieve today's soil treatment standards.[28] See also Chapter 4 in Soil Treatability Analysis Report.

Pooled bench, pilot, and full scale data in the SDB are expected to depict what the various treatment technologies can achieve for other hazardous soils managed under CERCLA and RCRA. As noted earlier, non-combustion technologies will behave better on a given range or class of organic and metal constituents. A given range of soil characteristics that may inhibit treatment performance can be amended to facilitate the treatment of hazardous soils. Available information on other full scale operations of the tested technologies demonstrate that optimization techniques can be used to overcome potential soil interferences and thus attain, generally, treatment design objectives. Hence, it is important to carefully evaluate the characteristics of each site against the expected capabilities of various non-combustion technologies, which are summarized below.

(3) Performance Data for Organic Constituents. EPA's conclusions with respect to achievability of soil treatment standards for organics in hazardous soils are based on the performance of biological treatment, chemical extraction, dechlorination, soil washing, thermal desorption, and soil vapor extraction. Other treatment technologies capable of achieving the treatment limits (such as combustion) are not prohibited except for those that may constitute impermissible dilution. Tables 2 and 3 below provide an overview of the number of data points and the average treatment efficiency ranges that each of the technology categories achieved. Also, each Table below reports the range of test scales as well as the available treatment performance data per major chemical family category/cluster assigned to chemical constituents in the BDAT List. (For the whole list of BDAT constituents and their classification, see Appendix B in the BDAT Background Document for Hazardous Soils, August 1993.) Further details and discussion on the results for major chemical family categories/clusters is contained in the docket.

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[28] See (1) *Remediation Case Studies: Bioremediation and Vitrification,* July 1997, EPA 542–R–97–008 or PB97–177554; (2) *Remediation Case Studies: Soil Vapor Extraction and Other In Situ Technologies,* July 1997, EPA 542–R–97–009 or NTIS PB97–177562; (3) *Analysis of Selected Enhancements for Soil Vapor Extraction,* September 1997, EPA–542–R–97–007; (4) *Remedial Case Studies: Thermal Desorption, Soil Washing, and In Situ Vitrification,* March 1995, EPA 542–R–95–005 or NITS PB95–182945; (5) *Remediation Case Studies: Soil Vapor Extraction,* March 1995, EPA 542–4–95–004 or NTIS PB95–182937; and (6) *Remediation case Studies: Bioremediation,* March 1995, EPA 542–R–95–002 or NTIS PB95–182911.

TABLE 2.—SUMMARY OF NONTHERMAL TREATMENT PERFORMANCE DATA ON GROUPS OF ORGANIC HAZARDOUS CONSTITUENTS[29]

BDAT organic cluster	Biotreatment scale: 0.01 kg to 1,250,000 kg		Chemical extraction scale: 0.0075 kg to 37,000 kg		Dechlorination scale: 0.1 kg to 127,913 kg		Soil washing scale: 0.08–204 kg		Hydrolysis scale: 0.1 kg to 2.75 kg	
	Data points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency
Volatiles	48	>99%	9	>99%	13	96.3 to 99.3%	None	None	None	None
Semivolatiles	185	55–98.2%[30]	163	62–98.8%	2	99.8%	13	81.8–97.2%	None	None
Organochlorine	12	16.7—70.2%	None	None	13	>95.2%	None	None	2	67.9–91.7%
Phenoxyacetic Acid Pesticides	None	None	None	None	9	98.6–99.0%	None	None	None	None
Organo Phosphorous insecticides[31]	None	None	None	None	None	None	None	None	None	None
Polychlorinated Biphenyls	None	None	52	71.5%–99.9%	69	68.8–97.1%	1	88.5%[32]	None	None
Dioxins and Furans	None	None	12	40–>97%	48	73.7–>99.8%	7	84.8%	None	None
Total Number of Data Points	245		236		154		21		2	

TABLE 3.—SUMMARY OF THERMAL PERFORMANCE DATA ON GROUPS OF ORGANIC HAZARDOUS CONSTITUENTS[33]

BDAT organic cluster	Thermal desorption[34] scale: 21.6 kg to 3,823,000 kg		Soil vapor extraction scale: 4.5 kg to >1,000 kg	
	Data points	Average removal efficiency	Data points	Average removal efficiency
Volatiles	293	79.2–99.9%	189	44–99.2%
Semivolatiles[35]	614	50–99.4%	47	0–57.2%
Organochlorines	12	88.5–98.8%	None	None
Phenoxyacetic Acid Pesticides	None	None	None	None
Organo Phosphorous insecticides[36]	None	None	None	None
Polychlorinated Biphenyls	1	87.5%	None	None
Dioxins and Furans	37	85.6–97.6%	None	None
Total Number of Data Points	957		236	

As shown on Tables 2 and 3, EPA lacks performance data for the thermal or non-thermal treatment of four organic constituents classified in the BDAT list as organophosphorous insecticides. These four constituents are disulfoton, famphur, methyl parathion, and phorate. However, we can determine achievability for these four organic constituents based upon the transfer of treatment data for other, similarly difficult to treat organics. Because of structural and chemical similarities, these four organophosphorous compounds are expected to behave similarly during treatment to other polar nonhalogenated phenols, phenyl ethers, and cresols. Thus, EPA believes that these four organophosphorus compounds can be treated by the same technologies as other polar nonhalogenated organic compounds, for which EPA has data. Therefore, based on the available data for polar nonhalogenated compounds, EPA concludes that the treatment standards for soils contaminated with these four organophosphorous compounds can be achieved by biodegradation, chemical extraction, and thermal desorption (semivolatiles).

(4) Other Indicia of Achievability for Organic Constituents

EPA also re-analyzed certain portions of the SDB with regard to ability of various technologies to meet today's soil treatment standards by looking more closely at organic treatability groups based on the structural features of the hazardous constituents of concern. The results of this analysis, presented in Table 4 below, corroborate those in Tables 1–3 and EPA's conclusion that the soil treatment standards—ten times UTS or 90% reduction—are within the zone of reasonable values that could have been selected. For further information on the derivation of Table 4, see the background document entitled ''Derivation of Treatment Achievability Results for Organic Functional Groups and Types of Compounds.''

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[29] For a discussion of these treatment data, see the Soil Treatment Achievability Report; Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); and the Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble, (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[30] Cyclical hydrocarbons with more than five rings undergo lower reduction efficiencies.

[31] EPA is transferring the available performance data from the chemical extraction and the biological treatment of (semivolatile) polar nonhalogenated organics in the hazardous solid treatment data base. Thus, the columns are intentionally left blank.

[32] Only one test was performed.

[33] For a discussion of these treatment data, see the Soil Treatment Achievability Report; Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA) and the Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble, (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[34] The term thermal desorption, as used in this table, is a general description of various thermal techniques. No conclusion may be drawn about the regulatory status or classification of a particular thermal desorber from the inclusion of treatment data from that device in this column.

[35] The performance of combustion and soil vapor extraction is less effective in treating semivolatile organics that contain aromatic and heterocyclical structures. The same is true for and nonvolatile chlorinated organics.

[36] EPA is transferring the available performance data from the chemical extraction and the biological treatment of (semivolatile) polar nonhalogenated organics in the hazardous soil treatment data base.

TABLE 4.—TREATMENT EFFICIENCY—PERCENT REDUCTION RANGES BY TECHNOLOGY FOR VARIOUS FUNCTIONAL GROUPINGS

[Average percent reduction in brackets; number of data points analyzed in parentheses][37]

Treatability group	Biological treatment	Chemical extraction	Dechlorination	Thermal desorption[38]	Soil washing	Other technologies[39]
Halogenated Nonpolar Aromatics	52.05–99.97 [76.01] (2)	80.42 [80.42] (1)	99.05–100 [99.53] (2)	29.19–100 [95.31] (29)	66.21–95.6 [85.41] (4)	30.13—49.68 [42.41] (3)
Dioxins, Furans, PCBs, and Precursors	none	14.88–99.97 [90.13] (40)	91.66–99.88 [97.94] (20)	98.9–100 [99.57] (17)	none	none
Halogenated Phenols, Cresols, and Other Polar Aromatics	45.1–95.14 [81.05] (5)	63.83–93.18 [79.46] (3)	none	2.71–99.93 [56.21] (15)	6.25–99.06 [73.71] (6)	96.21 [96.21] (1)
Halogenated Aliphatics	99.87–99.99 [99.91] (3)	86.62–94.81 [91.09] (3)	89.06–100 [97.54] (7)	36.88–100 [96.49] (80)	58.68–99.4 [90.58] (9)	72–99.68 [95.66] (6)
Halogenated Cyclic Aliphatics, Ethers, Esters, and Ketones	9.76–99.77 [60.99] (8)	none	none	none	none	none
Nitrated Aromatics and Aliphatics	none	none	none	none	none	none
Simple Nonpolar Aromatics and Heterocyclics	99.97–100 [100] (10)	77.41–99.92 [90.77] (6)	96.39–100 [98.61] (10)	22.68–100 [94.3] (158)	47.74–99.91 [82.39] (14)	97.7 [97.7] (1)
Polynuclear Aromatic Hydrocarbons	5.13–99.85 [67.15] (75)	51.55–99.98 [95.72] (125)	10.92–97.42 [67.47] (3)	10.14–100 [94.19] (301)	81.83–92.19 [85.74] (3)	95.9–99.55 [97.73] (2)
Other Nonhalogenated Polar Organics	none	75.96–99.82 [98.35] (28)	90.81–99.89 [95.13] (10)	2.6–99.98 [82.04] (36)	51.07–99.97 [88.67] (10)	94.59–99.89 [97.24] (2)

(5) Performance Data for Metal Contaminants

Performance data for metals contaminants are based on the performance of stabilization and chemical extraction (mercury) of soils contaminated with metals. Other metal treatment technologies are not prohibited (except if impermissible dilution were to occur). The results of EPA's analysis of the data on treatment of metals in soils are summarized in Table 5 below.

TABLE 5.—SUMMARY OF PERFORMANCE DATA FOR HAZARDOUS METALS CONSTITUENTS[40]

BDAT metals cluster	Stabilization scale: bench, pilot, and full scale		Chemical extraction scale: pilot		Soil washing scale: bench & pilot	
	Data Points	Average removal efficiency	Data points	Average removal efficiency	Data points	Average removal efficiency
Metals	269	91.1–99.8%	4	97.7%[41]	14	17.9–97.2%
Total	269	....	4	....	14	

The results in Table 5 corroborate EPA's conclusion that the soil treatment standards—ten times UTS or 90% reduction—are within the zone of reasonable values that could have been selected. For further information on the derivation of Table 5, see Soil Treatability Analysis Report.

With respect to multiple metal constituents or organometallic constituents in a contaminated soil, we

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[37] Table based on data from *"Delivery of Graphs and Data Tables Showing Corrected Treated Concentrations vs. Data Point Number Index for Selected Constituents,"* February 19, 1992 (Administrative Record of the proposed LDR Phase 2 rules as F–93–CS2P–S0597). See also (1) Derivation of Treatment Achievability Results for Organic Functional Groups and Types of Compounds, April 1998 (USEPA); (2) Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8. of Phase IV Final Rule Preamble, (April 1998, USEPA); (3) Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); and (3) Soil Treatability Analysis Report (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[38] The term thermal desorption, as used in this table, is a general description of various thermal techniques. No conclusion may be drawn about the regulatory status or classification of a particular thermal desorber from the inclusion of treatment data from that device in this column.

[39] These include air stripping, photolysis, and treatment trains.

[40] For a discussion of these treatment data, see the Soil Treatment Achievability Report; Extrapolation of Treatment Performance Data in the Soil Data Base Among Hazardous Constituents in Contaminated Soils (April 1998, USEPA); and the Additional Information on Treatability of Contaminated Soils as Discussed in Section VII.B.8 of Phase IV Final Rule Preamble, (April 1998, USEPA). These documents indicate the numbers and types of data pairs that meet the 10 times UTS level, both prior to treatment and after the treatment described in the table.

[41] Available data are exclusively for the treatment of mercury on soils.

recognize that a situation may call for two or more treatment technology trains to achieve the treatment standards promulgated today (e.g., one treatment for organics and another for metals). This must include proper consideration of the order in which various treatment processes should be applied to the contaminated soil so that treatment effectiveness is optimized. However, if these considerations have been properly made and the required treatment standards are not being met because, for example, of unique soil matrices or difficult to treat sites, then we expect that entities may elect to seek a treatment variance pursuant to 40 CFR 268.44(h) or a risk-based soil treatment variance, which is being adopted in today's rule.

c. Data Submitted by Commenters

At least four commenters submitted treatment data from studies describing the performance of innovative and conventional treatment technologies on hazardous soils. DuPont submitted bench, pilot, and full scale treatment data from various vendors describing the operation of soil washing. DuPont asserts these data supports the viability of soil washing as an innovative technology for hazardous soils.

The Environmental Technology Council (formerly the Hazardous Waste Treatment Council) submitted full, pilot, and bench scale treatment data from various vendors of innovative treatment technologies and provided an extensive review of EPA's soil treatment data base. See document entitled, Evaluation of Proposed BDAT Soil and Process Treatment Technologies—Report to the Hazardous Waste Treatment Council, November 1993 (filed as document number CS2P00060.E in Docket No. F–92–CS2P–FFFFF). Based on the ETC's technical report and the subsequent comments of the ETC to the HWIR-Media rule (see comments from the Environmental Technology Council, filed as comment number MHWP 00088 in Docket No. F–92–CS2P–FFFFF), the ETC believes that today's treatment standards for hazardous soils are achievable using thermal treatment. Although the ETC report stated that EPA may lack full-scale treatment data for several innovative or alternative technologies, the ETC data support EPA's view that the many full scale operations of non-combustion technologies demonstrated in the field were sufficient to support a view that the soil treatment standards were achievable. Further, the ETC pointed to various examples of how various non-combustion treatment technologies can be better optimized. EPA concurs with many of those observations on how non-combustion technologies can be optimized.

Two other commenters submitted data in the Phase 2 rule regarding the performance of non-combustion technologies—USPCI and Sierra Environmental Services. USPCI's performance data describe the treatment of polynuclear organics in soils via chemical oxidation followed by stabilization. These data were determined to be insufficient to support a broad national determination that stabilization of organics can be considered BDAT for organics. However, use of organic stabilization may, in some situations, be a permissible treatment option since the LDRs do not specifically prohibit the use of stabilization or solidification to treat nonwastewaters containing hazardous organic constituents. See Response to Comment Document, Comment from Chemical Waste Management, Inc. (No. PH4P–00048). There are, however, specific circumstances in which stabilization or solidification would be considered impermissible dilution. We expect that, for these types of situations to be properly evaluated, it will be necessary to petition for a treatment variance under 40 CFR 268.44(h) or under the provisions for a risk-based soil treatment variance being adopted in today's rule. The Agency also is currently considering whether, in the near future, to issue guidance on when stabilization or solidification of organic-bearing waste is appropriate and when it may constitute impermissible dilution.

Sierra Environmental Services submitted performance data regarding the treatment of carcinogenic polyaromatic hydrocarbons (cPAH) via bioremediation. These data are based on in-situ treatment of a 7.5 acre lagoon which was divided into two cells. Although the facility remediated 35 volatile, 65 semivolatile organics, PCBs, and pesticides, the facility only submitted data describing the treatment of major PAHs. Based on the performance of the biotreatment process applied to this site, the commenter argued the proposed treatment standards, if promulgated as proposed, would eliminate biotreatment as an alternative at this facility. EPA disagrees. Remediation processes that are applied in-situ do not trigger land disposal restrictions. If the facility were biotreating the lagoon sludges ex-situ, EPA concurs that the facility may be unable to land dispose the treated lagoon sludges. We also note that, under the existing regulations and regulations being adopted today, the commenter may be able to avail itself of a treatment variance, depending on the site-specific circumstances involved.

9. Applicability of Soil Treatment Standards and Readability of Final Regulations

Many commenters asserted that the proposed regulations governing applicability of LDRs to contaminated soil were difficult to understand and apply. EPA was persuaded by these comments and has reformatted the applicability regulations into an easier-to-read table. The Agency recognizes that determining whether or not LDRs apply to any given volume of contaminated soil can be complicated. To further assist program implementors and facility owners/operators, we will review and discuss the principles that govern LDR applicability for contaminated soil in this section of today's preamble.

The following principles informed EPA's decisions concerning application of LDRs to contaminated soils.

First principle: land disposal restrictions only attach to prohibited hazardous waste (or hazardous contaminated soil) when it is (1) generated and (2) placed in a land disposal unit.[42] Therefore, if contaminated soil is not removed from the land (i.e., generated), LDRs cannot apply. Similarly, if contaminated soil is removed from the land (i.e., generated) yet never placed in a land disposal unit, LDRs cannot apply.[43] In other words, LDRs do not apply to contaminated soil *in situ* or force excavation of contaminated soil. If soils are excavated, however, LDRs may apply, as discussed below.

Second principle: once a decision has been made to generate and re-land-dispose contaminated soils, LDRs generally only apply to contaminated soils that contain hazardous waste. The Agency considers soil to contain hazardous waste: (1) when it exhibits a

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[42] As discussed earlier in today's final rule, all hazardous wastes that were listed or identified at the time of the 1984 Hazardous and Solid Waste Amendments to RCRA have been prohibited from land disposal. EPA is required to prohibit hazardous wastes listed or identified after 1984 within six months of the wastes' listing or identification. RCRA Section 3004(g)(4). A table in 40 CFR Part 268 Appendix VII. outlines the dates of LDR applicablity for hazardous wastes.

[43] Note that, as discussed later in today's preamble, nothing in today's final rule affects implementation of the existing "area of contamination" policy. Therefore, soil managed within areas of contamination, even if it is "removed from the land" within such an area, would not be considered to be "generated." See the discussion of the area of contamination policy later in today's preamble.

characteristic of hazardous waste; and, (2) when it is contaminated by certain concentrations of constituents from listed hazardous waste. The contained-in policy is discussed in Section VII.E of today's preamble.

Third principle: once LDRs attach (generally, at the point of generation, see principle (1)) to any given hazardous waste or volume of hazardous contaminated soil, the LDR treatment standards continue to apply until they are met. This principle comes from application of the logic of the Chemical Waste opinion. In that opinion, the D.C. Circuit held that land disposal prohibitions attach at the point that a hazardous waste is generated and continue to apply until threats posed by land disposal of the waste are minimized. Chemical Waste Management v. EPA, 976 F.2d at 13, 14 and 24. In illustration of this principle, the court held that (in the case of characteristic hazardous waste) elimination of the property that caused EPA to identify a waste as hazardous in the first instance does not automatically eliminate the duty to achieve compliance with LDRs. As discussed later in this section of today's preamble, EPA has determined that, although the Chemical Waste opinion did not address contaminated soils *per se,* it is prudent to apply the logic of the Chemical Waste opinion to contaminated soils.

Using these principles, EPA created the regulations and table that govern application of LDRs to contaminated soils, as discussed below.

The regulations that address application of LDRs to soil that exhibits a characteristic of hazardous waste are relatively straightforward. Soil that exhibits a characteristic of hazardous waste when it is generated is subject to LDRs and must be treated to meet LDR treatment standards prior to land disposal. EPA's conclusion that soil that exhibits a characteristic of hazardous waste must be treated to meet LDRs prior to land disposal derives from a simple application of the principles above. First, LDRs have the opportunity to attach to contaminated soil at the point of generation (principle (1)) and, second, under the contained-in policy, soil that exhibits a characteristic of hazardous waste must be managed as hazardous waste (principle (2)) and, therefore, must comply with LDRs. Note that, once LDRs have attached to soil that exhibits a characteristic of hazardous waste, LDR treatment standards must be met prior to land disposal of the soil, even if the characteristic is subsequently eliminated (principle (3)).

The remainder of today's regulations on application of LDRs to contaminated soil, which are in table form, apply to soil contaminated with listed hazardous wastes. The table lists four scenarios.

In the first scenario, soil is contaminated with untreated listed hazardous waste that was prohibited from land disposal when first land disposed (e.g., prohibited hazardous waste that was illegally placed or prohibited hazardous waste that was spilled). In this case, LDRs have already attached to the hazardous waste. Therefore, since LDRs have attached to the waste and threats have not yet been minimized (i.e., treatment standards have not been met), under principle (3) LDRs continue to apply to the waste and, automatically, to any contaminated soil.[44] The Agency has concluded that LDRs apply to soils contaminated in this way regardless of whether the soil is determined not to (or no longer to) ''contain'' hazardous waste either when first generated or at any time in the future. This conclusion comes from application of principle (3): once something is prohibited from land disposal, LDRs continue to apply until threats to human health and the environment posed by land disposal are minimized regardless of whether the material is at some point determined no longer to be ''hazardous.''

In the next two scenarios, soil is contaminated with hazardous wastes that were not prohibited from land disposal when first land disposed, but, sometime after land disposal, LDRs have gone into effect. In these cases, whether or not LDRs apply to contaminated soil is governed by a determination of whether or not any given volume of contaminated soil ''contains'' hazardous waste at its point of generation. If any given volume of soil is determined to contain hazardous waste at its point of generation, LDRs attach (principles (1) and (2)) and, therefore, the LDR treatment standards must be met prior to placement of such soil in a land disposal unit (principle (3)). If any given volume of soil is determined not to contain hazardous waste at its point of generation, there is no hazardous waste to which a land disposal prohibition could attach and the soil, thus, would not be prohibited from land disposal (principles (1) and (2)). (It would be the same if a hazardous waste land disposed before the effective date of an applicable land disposal prohibition were delisted when first re-generated. In that case too, there would be no hazardous waste to which a land disposal prohibition could attach and the delisted waste, thus, would not be prohibited from land disposal.) Note that, under principle (3), once LDRs attach to contaminated soil, the treatment standards must be met prior to land disposal even if the soil is, subsequently, determined no longer to contain hazardous waste.

The final scenario requires no elaboration; it simply makes clear that if soil is contaminated by hazardous waste that was never prohibited from land disposal, LDRs do not apply. This is through application, primarily, of principle (2)—LDRs attach only to hazardous wastes or soil that contains hazardous waste.

Note that, because LDRs apply to the waste ''contained-in'' soil, and not the soil itself (see principle (2)), LDRs do not apply to soil that is at any time completely separated from its contaminating waste (i.e., the soil contains no solid or hazardous waste, it's ''just soil''). One might determine that soil contained no solid or hazardous waste, for example, if concentrations of hazardous constituents fall below natural background levels or are at non-detectable levels. Such a determination would terminate all RCRA Subtitle C requirements, including LDRs, since waste would not longer be ''contained-in'' the soil. See September 15, 1996 letter from Michael Shapiro (EPA) to Peter Wright (Monsanto Company), making this finding; see also, 61 FR 18806 (April 29, 1996) and other sources cited therein.

The following examples illustrate application of LDRs to contaminated soil:

1. Generator A is excavating soil mildly contaminated with wastewater treatment sludge (listed waste F006). The sludge was land disposed before 1980. The soil does not exhibit a characteristic of hazardous waste and has been determined by an authorized state not to contain listed hazardous waste. The soil is not prohibited from land disposal. This is because, for LDR purposes, the point of generation is when the soil is first excavated from the land (principle (1)). Since no prohibited hazardous waste existed before that time (i.e., the contaminating waste was not prohibited) and the soil does not contain listed hazardous waste or exhibit a characteristic of hazardous waste at its point of generation, there is

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[44] EPA is assuming that the waste did not meet a treatment standard when it was placed on the soil. Wastes which meet a treatment standard are no longer prohibited from land disposal and, unless it is determined to ''contain'' hazardous waste at its point of generation and are subsequently land disposed, soils contaminated by these wastes are, likewise, not prohibited from land disposal. See, RCA section 3004(m)(2) (hazardous wastes meeting treatment standards are no longer prohibited from land disposal).

no hazardous waste to which a land disposal prohibition could attach (principle (2)).

2. Generator B is excavating soil contaminated by leaks from a closing hazardous waste surface impoundment. The surface impoundment received listed hazardous wastes K062 (spent pickle liquor) and characteristic hazardous waste D018 (wastes that fail the TCLP test for benzene). The surface impoundment stopped receiving K062 waste in 1987 and D018 waste in 1993. The soil does not exhibit a characteristic of hazardous waste and has been determined by an authorized state not to contain listed hazardous waste. The soil is not prohibited from land disposal. This is because, for LDR purposes, the point of generation is when the soil is first excavated from the land (principle (1)). Since no prohibited hazardous waste existed before that time (i.e., the contaminating wastes were not prohibited) and the soil does not contain listed hazardous waste or exhibit a characteristic of hazardous waste at its point of generation, there is no hazardous waste to which a land disposal prohibition could attach (principle (2)).

3. Generator C is excavating soil contaminated with listed hazardous waste F024. The F024 waste was land disposed after 1991, after it was prohibited from land disposal, and was not first treated to meet applicable land disposal treatment standards (i.e., it was illegally land disposed or accidentally spilled). Since the contaminating waste was prohibited from land disposal and treatment standards were not achieved prior to land disposal, the LDR prohibition continues to apply to any soil contaminated by the waste (principle (3)) regardless of whether the soil ''contains'' hazardous waste when generated. The soil is prohibited from land disposal and, before land disposal, must be treated to meet applicable technology-based treatment standards or until a site-specific, risk-based minimize threat determination is made through the variance process.

4. Generator D is excavating soil contaminated by an accidental spill of benzyl chloride, which, when discarded, is listed hazardous waste P028 and is prohibited from land disposal. The accidental spill occurred yesterday. The contaminating waste was prohibited from land disposal and, since the treatment standards were not achieved prior to the accidental spill, the prohibition continues to apply to any soil contaminated by the waste (principle (3)). Thus, the soil is prohibited from land disposal and, before land disposal, must be treated to meet applicable technology-based treatment standards or until a site-specific, risk-based minimize threat determination is made through the variance process.

5. Generator E is excavating soil contaminated by listed hazardous waste F004 (generally, spent non-halogenated solvents). The F004 waste was land disposed in 1984, prior to the effective date of an applicable land disposal prohibition; however, on generation the soil contains high concentrations of cresols constituents, so that an authorized state determines it ''contains'' hazardous waste. The soil is prohibited from land disposal. Although the contaminating waste was not prohibited from land disposal, since the soil contained hazardous waste at the point of generation (and the waste had since become prohibited from land disposal), the land disposal prohibition attaches to the contaminated soil and, before land disposal, the soil must be treated to meet applicable technology-based treatment standards or until a site-specific, risk-based minimize threat determination is made through the variance process (principles (1), (2), and (3)).

EPA acknowledges that the reading of LDR applicability to contaminated soil discussed above creates potential administrative difficulties, since, in many cases, a factual determination will be required as to when hazardous wastes were land disposed in order to determine whether they were prohibited at that time and whether, therefore, the prohibition continues to apply to contaminated soil. The Agency expects that these difficulties will be minimal because, in most cases, contamination will be caused by hazardous wastes placed before the effective date of applicable land disposal prohibitions since land disposal after prohibition would be illegal. The exception is accidental spills of hazardous waste, which the Agency believes are (1) rare, and (2) known, so determining dates of land disposal should not be problematic. This issue was discussed in detail in the HWIR-Media proposal. 61 FR 18805 (April 26, 1996).

As discussed in the April 29, 1996 proposal, the Agency continues to believe that, if information is not available or inconclusive, it is generally reasonable to assume that contaminated soils do not contain untreated hazardous wastes placed after the effective dates of applicable land disposal prohibitions. This is because placement of untreated hazardous waste after applicable LDR effective dates would be a violation of RCRA, subject to significant fines and penalties including criminal sanctions. 61 FR at 18805 (April 29, 1996). Of course, program implementors and facility owners/operators cannot make the determination that information on the types of waste contamination or dates of waste placement is unavailable or inconclusive without first making a good faith effort to uncover such information. By using available site- and waste-specific information such as manifests, LDR records required under 40 CFR 268.7, vouchers, bills of lading, sales and inventory records, storage records, sampling and analysis reports, accident reports, site investigation reports, spill reports, inspection reports and logs, EPA believes that program implementors and facility owners/operators will typically be able to make informed decisions about the types of waste contamination and dates of waste placement. Most commenters supported this approach.

EPA notes that it is not critical for a decision about whether contaminated soil contains listed hazardous waste or exhibits a characteristic of hazardous waste to be made without removing any of the soil (other than the sample volume) from the land. In an area of generally dispersed soil contamination, soil may be consolidated or managed within the area of contamination to facilitate sampling, for example, to ensure that soil samples are representative or to separate soil from non-soil materials. However, care should be taken not to remove hazardous contaminated soils from separate areas of contamination at a facility and place such hazardous contaminated soil into a land disposal unit unless, of course, the soil meets applicable LDR treatment standards. The area of contamination policy is discussed later in this section of today's preamble.

A few commenters expressed concern or confusion over the application of LDRs to soil contaminated by accidental spills of hazardous wastes. The Agency clarifies that accidental spills of hazardous wastes (or products or raw materials) are not considered placement of hazardous waste into a land disposal unit since, in the case of a spill, prohibited waste is not being placed in one of the identified units named in RCRA Section 3004(m).[45] See, 45 FR 76626 (Nov. 19, 1980), issuing clarifying regulations at 40 CFR 264.10(g) to provide that hazardous waste treatment

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[45] Although, if such a spill were not cleaned up in a timely way, EPA or an authorized state could determine that the contaminated area should be considered a land disposal unit for purposes of requiring cleanup under RCRA Subtitle C. 55 FR at 20809 (July 27, 1990).

and storage activities undertaken in immediate response to an accidental spill are exempt from the 40 CFR Part 264 and 265 regulations governing treatment and storage and do not require permits and Sept. 29, 1986 memo from J. Winston Porter (EPA Assistant Administrator) to Fred Hansen interpreting the 40 CFR 264.10(g) regulations; also see, 55 FR at 30808–30809 (July 27, 1990) (''a one-time spill of hazardous waste would not be considered a solid waste management unit.'') However, contaminated soils generated through remediation of spills of untreated listed prohibited hazardous wastes are, as discussed above, subject to land disposal prohibitions since the LDR prohibition that had attached to the contaminating hazardous waste continues to apply until threats are minimized, and, therefore, any contaminated soil remains subject to LDRs (see principle (3)).

A number of commenters expressed concern that EPA's interpretation of LDR applicability to contaminated soil might preclude application of the existing area of contamination policy. In the area of contamination policy, EPA interprets RCRA to allow certain discrete areas of generally dispersed contamination to be considered a RCRA unit (usually a landfill). 55 FR 8758–8760 (March 8, 1999). This interpretation allows hazardous wastes (and hazardous contaminated soils) to be consolidated, treated *in situ* or left in place within an area of contamination without triggering the RCRA land disposal restrictions or minimum technology requirements—since such activities would not involve ''placement into a land disposal unit,'' which is the statutory trigger for LDR. EPA clarifies that its interpretation of LDR applicability for contaminated soil does not, in any way, affect implementation of the area of contamination policy.

Finally, many commenters expressed concern over EPA's application of the LDR treatment standards to soil that is determined no longer to contain hazardous waste or exhibit a characteristic of hazardous waste. As discussed in detail in the 1996 proposal, at this time EPA has concluded that although the Chemical Waste opinion did not speak to contaminated soil specifically, it is prudent to apply the Chemical Waste logic—that a duty to comply with LDRs attaches to hazardous waste when it is first generated and elimination of the indicia of ''hazardousness'' does not, necessarily, fulfil the statutory land disposal restriction treatment standard—to contaminated soil. See Chemical Waste Management v. EPA, 976 F.2d at 13–16. Although, as discussed later in today's preamble, EPA believes that contained-in determinations will rarely, if ever, be made at constituent concentrations which do not minimize threats, without codifying the contained-in policy, the Agency cannot make the generic finding that this will be the case at every site. For this reason, EPA is requiring that the standards and procedures promulgated today for site-specific, risk-based minimize threat variances alone be used to make minimize threat determinations. This issue is discussed in section VII.E of today's preamble.

C. Conforming and Supporting Changes

To support the land disposal restriction treatment standards for contaminated soil, the Agency is today promulgating a number of conforming and supporting regulations, as follows.

1. Recordkeeping Requirements

A number of commenters expressed confusion over the recordkeeping and reporting requirements that would apply to contaminated soil. The Agency is today clarifying that contaminated soil subject to the land disposal restrictions must comply with the same recordkeeping and reporting requirements as other wastes subject to the land disposal restrictions. That is, the recordkeeping and reporting requirements of 40 CFR 268.7 will apply.

EPA has clarified this in the final regulations by adding appropriate recordkeeping requirements for contaminated soils to the tables in 40 CFR 268.7(a) and 40 CFR 268.7(b). These rules specify that, for contaminated soil, generators and/or treaters must include the following information with their land disposal restriction paperwork: the constituents subject to treatment as described in 40 CFR 268.49(d) and this statement, ''this contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and [is subject to/complies with] the soil treatment standards as provided by 268.49(c) or the universal treatment standards.'' Note that because in some cases contaminated soil will continue to be subject to LDRs even after it has been determined not to or no longer to contain listed hazardous waste (or de-characterized), the statement includes a notification of whether the soil is still considered hazardous. This is consistent with the approach the Agency used when establishing land disposal restriction treatment standards for hazardous contaminated debris.

2. Definition of Soil

The Agency is promulgating the definition of soil from the April 29, 1996 proposal with one change made in response to comments. Soil is defined as, ''unconsolidated earth material composing the superficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles as classified by the U.S. Soil Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume, based on visual inspection.'' The Agency has added the phrase ''by volume, based on visual inspection'' in response to comments recommending that EPA explicitly conform the definition of soil with the definition of debris. See 57 FR 37222 (August 18, 1992). This clarification is consistent with the Agency's intent, as discussed in the 1996 proposal, that determinations of whether any material was ''soil,'' ''debris,'' or ''waste'' to be made in the field. 61 FR 18794 (April 26, 1996).

The definition of soil includes the concept that mixtures of soil and other materials are to be considered soil provided the mixture is made up predominantly of soil and that the other materials are inseparable using simple physical or mechanical means. This approach allows program implementors and facility owners/operators to determine whether any given material is soil, waste, or debris based on the results of simple mechanical removal processes commonly used to separate materials, such as pumping, dredging, or excavation by backhoe, forklift or other device. It avoids requiring chemical analysis for soil properties in order to differentiate precisely between wastes, soil and debris. As discussed in the April 29, 1996 and September 14, 1993 proposals, the Agency believes that attempting to distinguish more precisely between waste, soil or debris using chemical analysis or other tests would be prohibitively difficult to develop and support and cumbersome to administer. *Cf.* 57 FR at 37224, August 18, 1992, where the Agency adopted a similar classification system for hazardous debris. Most commenters supported this approach. Note that any non-soil that is separated from contaminated soil that contains listed hazardous waste or is found to exhibit a characteristic of hazardous waste should be considered hazardous waste and is subject to the applicable universal treatment standard.

EPA also emphasizes that any dilution of a prohibited contaminated soil (or of a prohibited hazardous waste with soil) as a substitute for adequate treatment to achieve compliance with LDR treatment standards or to circumvent the effective date of an LDR prohibition is considered a type of impermissible dilution and is illegal. Therefore, any deliberate mixing of prohibited hazardous waste with soil in order to change its treatment classification (i.e., from waste to contaminated soil) is illegal. Existing regulations concerning impermissible dilution already make this point. See 40 CFR 268.3(a) and (b); see also 57 FR at 37243 (Aug. 18, 1992) (adopting the same principle for contaminated debris). The Agency expects that deliberate mixing of hazardous waste with soil (and vice versa) will be rare because such actions are clearly illegal and would subject generators to substantial fines and penalties, including criminal sanctions. In addition, the resulting mixture (hazardous waste impermissible diluted by soil) would continue to be subject to the LDRs for the original hazardous waste (i.e., generally, the universal treatment standards), so no benefit in terms of reduced treatment requirements would occur. The Agency took a similar approach when promulgating treatment standards specific to hazardous debris. See 57 FR at 37224 (August 18, 1992).

The Agency notes that the normal mixing of contaminated soil from various portions of a site that typically occurs during the course of remedial activities or in the course of normal earthmoving and grading activities is not considered intentional mixing of soil with non-media or prohibited soil with non-prohibited soil and, therefore, is not a type of impermissible dilution.

D. Seeking Treatment Variances Because the National Treatment Standard is Unachievable or Inappropriate

Under existing regulations at 40 CFR 268.44, people may obtain a variance from a land disposal restriction treatment standard when a waste cannot be treated to the specified level or when a treatment standard may be inappropriate for the waste. With respect to contaminated soils, EPA has to this point presumed that a treatment variance would generally be needed because the LDR treatment standards developed for process wastes were either unachievable (generally applied to soil contaminated by metals) or inappropriate (generally applied to soil contaminated by organic constituents). See, for example, 55 FR 8760 (March 8, 1990); 58 FR 48092, 48125 (September 14, 1993); 61 FR 18805–18808, 18810–18812 (April 29, 1996); and, 61 FR 55717 (October 28, 1996). This presumption will no longer apply once today's soil treatment standards take effect. This is because today's standards were developed specifically for contaminated soils and are intended to specifically address the past difficulties associated with applying the treatment standards developed for process waste to contaminated soil.

This is not to say that treatment variances based on the ''unachievable'' or ''inappropriate'' prongs of the test are now unavailable for contaminated soils. For example, in some cases it may prove that even though an appropriate technology, suited to the soil matrix and constituents of concern was used, a particular soil cannot be treated to meet the soil treatment standards using a well-designed well-operated application of one of the technologies EPA considered in establishing the soil standards. In these types of cases, under existing regulations, the soil treatment standard would be considered ''unachievable'' and a treatment variance could be approved. In other cases, under existing regulations, application of the soil treatment standards might be ''inappropriate'' in that, for example, it would present unacceptable risks to on-site workers.

As noted earlier in today's preamble, alternative LDR treatment standards established through treatment variances must, according to 40 CFR 268.44(m), ''minimize threats to human health and the environment posed by land disposal of the waste.'' In cases where an alternative treatment standard does not meet this requirement, a treatment variance will not be approved even though application of a technology more aggressive than the technologies on which the soil treatment standards are based might then be necessary. For example, in cases where the soil treatment standards cannot be achieved through application of a well-designed, well-operated application of one of the model soil treatment technologies and application of the model technology or other non-combustion technologies will not result in constituent concentrations that minimize threats, a variance would not be approved and combustion would be necessary. This is proper given that the soil treatment standards were not developed using the methodology typically used in the land disposal restriction program (i.e., application of the most aggressive treatment technology to the most difficult to treat waste), but, instead are designed to accommodate a variety of soil treatment technologies that are typically used during remediation. Variances for treatment of contaminated soil will be applied during the remedial context, where, as discussed in Section VII.B.3 of today's preamble, EPA and authorized states will typically have detailed information about the risks posed by specific hazardous constituents, direct and indirect exposure routes, risk pathways and human and environmental receptors. This information can be used to inform decisions about whether threats are minimized.

E. The Contained-In Policy

The contained-in principle is the basis for EPA's longstanding interpretation regarding application of RCRA Subtitle C requirements to mixtures of contaminated media and hazardous wastes. Under the ''contained-in'' policy, EPA requires that soil (and other environmental media), although not wastes themselves, be managed as if they were hazardous waste if they contain hazardous waste or exhibit a characteristic of hazardous waste. See, for example, 53 FR 31138, 31148 (August 17, 1988) and 57 FR 21450, 21453 (May 20, 1992) (inadvertently citing 40 CFR 261(c)(2) instead of 40 CFR 261.3(d)(2)); see also Chemical Waste Management v. EPA, 869 F.2d 1526, 1539–40 (D.C. Cir. 1989) (upholding the contained-in principle as a reasonable interpretation of EPA regulations). In practice, EPA has applied the contained-in principle to refer to a process where a site-specific determination is made that concentrations of hazardous constituents in any given volume of environmental media are low enough to determine that the media does not ''contain'' hazardous waste. Typically, these so called ''contained-in'' determinations do not mean that no hazardous constituents are present in environmental media but simply that the concentrations of hazardous constituents present do not warrant management of the media as hazardous waste.[46] For contaminated soil, the result of ''contained-in determinations'' is that soil no longer ''contains'' a

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[46] Of course, as noted earlier, EPA or an authorized state could determine, at any time, that any given volume of environmental media did not contain (or no longer contained) any solid or hazardous waste (i.e., it's just media). These types of determinations might be made, for example, if concentrations of hazardous constituents fall below background levels, or are at non-detectable levels. Such a determination would terminate all RCRA Subtitle C requirements, including LDRs. See, September 15, 1995 letter from Michael Shapiro (EPA) to Peter Wright (Monsanto Company), making this finding, and 61 FR 18806 (April 29, 1996).

hazardous waste; however, as discussed above, the result is not automatically that soil no longer must comply with LDRs.

In order to preserve flexibility and because EPA believes legislative action is needed, the Agency has chosen, at this time, not to go forward with the portions of the September 14, 1993 or April 29, 1996 proposals that would have codified the contained-in policy for contaminated soils. The Agency continues to believe that legislation is needed to address application of certain RCRA subtitle C requirements to hazardous remediation waste, including contaminated soil. If legislation is not forthcoming, the Agency may, in the future, re-examine its position on the relationship of the contained-in policy to site-specific minimize threat determinations based on implementation experience and/or may choose to codify the contained-in policy for contaminated soil in a manner similar to that used to codify the contained-in policy for contaminated debris.

1. Current Guidance on Implementation of the Contained-in Policy

EPA has not, to date, issued definitive guidance to establish the concentrations at which contained-in determinations may be made. As noted above, decisions that media do not or no longer contain hazardous waste are typically made on a case-by-case basis considering the risks posed by the contaminated media. The Agency has advised that contained-in determinations be made using conservative, health-based levels derived assuming direct exposure pathways. 61 FR at 18795 (April 29, 1996) and other sources cited therein. A compilation of many of the Agency's statements on the contained-in policy has been placed in the docket for today's rulemaking.

The land disposal restriction treatment standards for contaminated soil promulgated today do not affect implementation of the contained-in policy. They are not considered, and should not be used, as de facto ''contained-out'' concentrations although, in some cases, it may be appropriate to determine that soil treated to the soil treatment standards no longer contains hazardous waste. Remediation project managers should continue to make contained-in decisions based on site-specific conditions and by considering the risks posed by any given contaminated media.

2. Relationship of the Contained-In Policy to Site-Specific, Risk-Based Minimize Threat Determinations

As discussed above, the D.C. Circuit held in the Chemical Waste opinion that the RCRA Section 3004(m) obligation to minimize threats can continue even after a waste would no longer be identified as ''hazardous.'' Chemical Waste Management v. EPA, 976 F.2d at 13–16. The Agency believes that it is prudent to apply the logic of the Chemical Waste opinion to contaminated soil. Therefore, when the contained-in policy is applied to soil that is already subject to a land disposal prohibition, the Agency is compelled to decide if a determination that soil does not or no longer ''contains'' hazardous waste is sufficient to determine that threats posed by subsequent land disposal of those soils have been minimized. As discussed earlier in today's preamble, EPA is not, at this time, able to make a generic finding that all contained-in determinations will automatically satisfy this standard. This is largely because, for reasons of needed administrative flexibility and because we believe legislation is needed, EPA has not codified standards for approving contained-in determinations and has not codified procedures for making such determinations. Absent such standards and procedures, the Agency cannot, at this time, make a generic finding that all contained-in determinations will result in constituent concentrations that also minimize threats within the meaning of RCRA Section 3004(m). These decisions, of course, could be made on a site-specific basis, by applying the standards and procedures for site-specific, risk-based minimize threat variances, promulgated today.

The regulations governing site-specific, risk-based minimize threat determinations promulgated today are, essentially, the same as the Agency's guidance for making contained-in determinations. See, for example, 61 FR 18795 (April 29, 1996) and other sources cited therein. That is, decisions should be made by considering the inherent risks posed by any given soil, assuming direct exposure (i.e., no post-land disposal controls) and applying conservative information to calculate risk. Therefore, the Agency expects that, in most cases, a determination that soils do not (or no longer) contain hazardous waste will equate with minimize threat levels and, therefore, encourages program implementors to combine contained-in determinations, as appropriate, with site-specific, risk-based minimize threat variances.

F. Relationship of Soil Treatment Standards to the Final HWIR-Media Rule

In the April 29, 1996 HWIR-Media proposal, EPA proposed to establish a comprehensive alternative management regime for hazardous contaminated media, of which the treatment standards for contaminated soil would have been a small part. The HWIR-Media proposal discussed a number of options for comprehensive management standards for hazardous contaminated media.

Today's action resolves and finalizes the portion of the HWIR-Media proposal that addressed land disposal restriction treatment standards for contaminated soil. See 61 FR 18805–18814, April 29, 1996. Other portions of the proposal are not resolved by this action and will be addressed by EPA in future actions. EPA continues to emphasize that, while the soil-specific LDR treatment standards will improve contaminated soil management and expedite cleanups, the Agency also recognizes that additional reform is needed, especially for management of non-media remediation wastes like remedial sludges. The Agency will continue to participate in discussions on potential legislation to promote this additional needed reform.

VIII. Improvements and Corrections to LDR Regulations

Summary: The regulated community has pointed out several examples of the LDR regulations that were unclear or had typographical errors. These sections are clarified and corrected below.

A. Typographical Error in Section 261.1(c)(10)

A typographical error was found in the cross reference in the note in § 261.1(c)(10). The first Phase IV final rule (''Minirule,'' 62 FR 25998) said ''They are covered under the exclusion from the definition of solid waste for shredded circuit boards being recycled (261.4(a)(13)).'' The correct cross reference is to ''(261.4(a)(14).'' This typographical error is corrected in this final rule.

B. Typographical Error in Section 268.4(a)(2)(ii) and (a)(2)(iii)

These paragraphs have referred to § 268.8 for some time. Section 268.8 was where the so called ''soft hammer'' provisions were once found in the regulations. These provisions expired in 1990, and the provisions have been removed from the regulations; thus there is no need to continue to include references to § 268.8.

C. Clarifying Language Added to Section 268.7

The first item in the paperwork tables requires that the EPA Hazardous Waste and Manifest numbers be placed on the notification forms. Today's changes clarify that the manifest number required to be placed on the notification form is that of the first shipment of waste to the treatment or disposal facility.

The tables of paperwork requirements found at § 268.7(a)(4) and (b)(3) have entries that describe what waste constituents have to be identified on the one-time LDR notification (see item 3 in the generator table at § 268.7(a)(4), and item 2 in the treatment and storage facility table at § 268.7(b)(3)). The language of these items has been changed to avoid confusion about whether wastes managed at facilities subject to the Clean Water Act (CWA), CWA-equivalent facilities, or wastes injected into deepwells subject to the Safe Drinking Water Act (SDWA) are subject to a paperwork requirement (and if so, what requirements). Wastes managed in these facilities are subject to a one-time notification requirement. This notification must be placed in the facility's on site files and must contain the information described in the paperwork tables. Therefore, the parenthetical language that appeared to exclude such facilities from the paperwork requirements has been removed from item 2 in the ''Generator'' table, and item 3 in the ''Treatment Facility'' table.

In addition, these items have been further clarified by adding the language ''in characteristic wastes'' after the clause ''and underlying hazardous constituents,'' to indicate exactly what type of wastes must be considered when determining whether underlying hazardous constituents are present. The title of the paperwork table at § 268.7(b)(3) has been changed to clarify that the requirements apply to storage facilities as well as treatment facilities. A number of certifications were inadvertantly removed from § 268.7(b) through Office of Federal Register drafting errors. Those certifications are reinstated because it was never the intention of the Agency that they were removed.

D. Correction to Section 268.40—Treatment Standards for Hazardous Waste

In the Phase III Final Rule (61 FR 15566), the Agency promulgated a UTS of 12.0 mg/L for 1,4-dioxane wastewaters based on the performance of distillation. At that time, 1,4-dioxane was the only UTS constituent for which EPA had promulgated a nonwastewater standard but not a wastewater standard. However, as part of that rule, the Agency failed to extend the treatment standard to wastewater forms of U108 wastes. Today, the Agency is correcting this oversight in Section 268.40—Treatment Standards for Hazardous Wastes, by replacing the ''NA'' designation under AU108 -1,4-Dioxane wastewaters@ with ''12.0 mg/L.'' As such the 1,4-Dioxane alternate treatment standard now applies to both wastewater and nonwastewaters forms of U108 waste.

E. Removal of California List Requirements and de minimis Provision From Section 268.42

In the Phase IV rule promulgated on May 12, 1997, EPA removed the California List requirements because they have all been superseded by more specific treatment standards. The California List included liquid wastes containing certain metals, cyanide, polychlorinated biphenyls (PCBs) above specified levels, and liquid and nonliquid halogenated organic compounds (HOCs) above specified levels. These wastes were removed from the Table of Treatment Standards in § 268.40; however, the requirements in § 268.42(a)(1) and (a)(2) were overlooked. These paragraphs are removed by today's rule. And because these paragraphs are being removed, it is necessary to revise the language of § 268.42(a) to remove references to these paragraphs.

The de minimis provision of paragraph § 268.42(a)(3) is also being removed by today's rule. The de minimis provision applied to wastewaters regulated under the Clean Water Act (CWA) mixed with high total organic carbon (TOC) ignitable wastes. In the Phase III final rule, however, wastes discharged under the CWA, or in a facility that is CWA-equivalent, are not subject to the LDRs (61 FR 15660, April 8, 1996). Therefore the *de minimis* provision was redundant and has been removed by today's rule.

F. Typographical Errors and Outdated Cross-References in Section 268.45

There is a typographical error in § 268.45(a). The language has referred to § 261.3(c)(2), a section removed from the regulations on September 30, 1992 (57 FR 49278). It should refer to § 261.3(f)(2). The correction is being made in this final rule.

In paragraphs (3) and (4) in § 268.45(d) there are outdated cross references to treatment standards that were once found at § 268.42 and § 268.43 (the treatment standards once found in these sections have been consolidated into the ''Table of Treatment Standards'' at § 268.40). These cross references have been removed from § 268.45(d)(3) and (d)(4).

G. Correction to § 268.48 to Explain That Sulfides are not Regulated as Underlying Hazardous Constituents in Characteristic Wastes

In response to a comment received on the original Phase IV proposal, EPA reviewed the basis for the universal treatment standard for sulfides in the Universal Treatment Standard Table at 40 CFR 268.48. EPA is correcting the table in this rule. Sulfides are regulated only in Waste Code F039 (multi-source leachate), and not as underlying hazardous constituents in characteristic wastes.

H. Cross References in Section 268.50(e)

Erroneous references appeared in this section to §§ 268.41, 268.42, 268.43, and 268.32. They are eliminated in this final rule.

I. Mistakes in Appendices VII and VIII

Table 1 includes entries for F033. There is no hazardous waste with the EPA waste code F033. Therefore, these entries are being removed. The second entry for waste codes F032, the second entry for F034, and the first entry for K088 contained typographical errors that are being revised in today's final rule. In addition, two entries for waste code F035 are being added to the table. Table 2 is amended by revising entry number 9 to change the prohibition date for soil and debris contaminated with K088 wastes.

The title of appendix VIII is revised to clarify that it provides the effective dates for wastes injected into deep wells.

J. Clarification Regarding Point of Generation of Boiler Cleanout Rinses

In the May 12, 1997 final Phase IV rule, EPA included in the preamble an interpretive discussion regarding at what point the Agency considers a waste to be generated when power plant boilers are cleaned out using multiple rinses. 62 FR at 26006. The question is relevant to the issue of whether subtitle C rules apply to such waste, and also, if the waste is to be land disposed, whether LDR prohibitions apply. In essence, the interpretation is that the cleanout of the boiler is to be viewed as a single process, so that if the boiler cleanout liquids are commingled in a single tank system, the hazardousness of the resulting cleanout liquids is to be determined at the end of the cleaning process. *Id.*

Some confusion has arisen regarding whether this interpretation applies to permanent storage tanks, or only to temporary tanks brought on-site to manage the boiler cleanout rinses. The Agency's view is that the interpretation applies to temporary tanks, and also to permanent tanks when such units are used exclusively for the management of boiler cleanout during the boiler cleanout process. (Such tanks could, of course, be engaged in other activities when they are not dedicated to management of boiler cleanout waste during the cleanout process.)

EPA did state in the May 12 notice that ''[t]he interpretation * * * does not apply where there are permanent storage units involved.'' 62 FR at 26007. What the Agency had in mind was a tank already engaged in the permanent storage of hazardous waste. However, so long as a tank is dedicated solely to storage of boiler cleanout rinses during the boiler cleanout process, there is no environmental distinction between whether or not a temporary or permanent tank is used for the purpose. Consequently, the point of generation interpretive principle announced in the May 12 notice applies to both permanent and temporary tanks systems.

IX. Capacity Determination for Phase IV Land Disposal Restrictions

A. Introduction

This section summarizes the results of the capacity analysis for the wastes covered by today's rule. For a detailed discussion of capacity analysis-related data sources, methodology, and response to comments for each group of wastes covered in this rule, see the background document for the capacity analysis and the background document for the comment summary and response for capacity-related issues (i.e., collectively referred to as the Capacity Background Documents).

In general, EPA's capacity analysis focuses on the amount of waste to be restricted from land disposal that is currently managed in land-based units and that will require alternative treatment as a result of the LDRs. The quantity of wastes that are not managed in land-based units (e.g., wastewater managed only in RCRA exempt tanks, with direct discharge to a Publicly Owned Treatment Works (POTW)) is not included in the quantities requiring alternative treatment as a result of the LDRs. Also, wastes that do not require alternative treatment (e.g., those that are currently treated using an appropriate treatment technology) are not included in these quantity estimates.

EPA's decisions on when to establish the effective date of the treatment standards (e.g., by granting a national capacity variance) are based on the availability of alternative treatment or recovery technologies. Consequently, the methodology focuses on deriving estimates of the quantities of waste that will require either commercial treatment or the construction of new on-site treatment as a result of the LDRs. EPA also estimates the quantities of waste that will be treated adequately either on site in existing systems or off site by facilities owned by the same company as the generator (i.e., captive facilities), and attempts to subtract that amount from the overall amount of required capacity.

B. Available Capacity for Surface Disposed Wastes

Available capacity was estimated for four treatment technology categories that are expected to be used for the majority of wastes in today's rule: stabilization (including chemical fixation), vitrification, metal recovery, and thermal treatment. (Numerous other types of treatment also can meet the treatment standards for much of these wastes, although the Agency did not find it necessary to present the estimates of available capacity of these treatments. See the Capacity Background Documents for further information.)

1. Stabilization

EPA estimates that there are at least several million mt/yr of available stabilization capacity, with most of it able to meet the treatment requirements for the TC metal wastes and newly identified mineral processing wastes. Furthermore, the Agency found that currently utilized stabilization capacity can be quickly modified (i.e., in less than 90 days) to meet the new treatment standards by implementing relatively simple changes to formulations. For additional details, see the Capacity Background Documents.

2. Vitrification

EPA has determined that vitrification technology is commercially available for treating limited quantities of Phase IV wastes, such as some arsenic wastes, that are difficult to treat using stabilization and other techniques. EPA estimates that there are approximately 15,000 mt/yr of available vitrification capacity.

3. Metal Recovery

High temperature and other types of metal recovery appears to be the most applicable treatment for certain wastes containing high concentrations of metal constituents. EPA identified and reviewed several metal recovery technologies that are commercially available, and has determined that at least 800,000 mt/yr of metal recovery capacity exists.

EPA recognizes, however, that not all of this capacity will be available for Phase IV wastes. For example, there are technical constraints on the metal recovery systems stemming from metal content limitations of the waste. Nevertheless, the Agency believes that a significant portion of this capacity is amenable to Phase IV wastes. For additional details, see the Capacity Background Documents.

4. Thermal Treatment

EPA estimates that there are approximately 231,000 mt/yr of commercial sludge/solid/soil combustion capacity and 651,000 mt/yr of commercial liquid combustion capacity available for wastes covered by today's rule. Other types of thermal treatment, such as thermal desorption, also are available. For additional details, see the Capacity Background Documents.

C. Required Capacity and Variance Determination for Surface Disposed TC Metal Wastes

EPA estimates that at most, 1.2 million mt/yr of TC metal wastes could require alternative treatment as a result of promulgation of today's rule. This estimate includes both wastes that are newly-identified TC wastes (i.e., wastes that do not fail the EP test, and, consequently, were not part of the Third Third LDR rule) and wastes that fail the EP test (i.e., those wastes that were regulated in the Third Third LDR rule). Although only the newly identified TC wastes are eligible for a national capacity variance, the capacity analysis includes all wastes affected by the rule because estimates for each category are not available, and, furthermore, because all of these wastes need to be assessed to determine the full impact of this rule on the need for a capacity variance. Additionally, the 1.2 million estimated quantity is likely to be an overestimate because most of these wastes are already meeting the new treatment standards. Also, most of these wastes are likely to fail the EP test and, therefore, are no longer eligible for a capacity variance.

The wastes that will require alternative treatment are expected to primarily only require optimization of existing stabilization formulations and systems. Also, sufficient vitrification capacity exists to treat the otherwise difficult-to-treat TC metal wastes, high temperature metal recovery capacity exists for some of the TC metal wastes, and sufficient and other combustion capacity exists to pre-treat TC metal wastes that contain organic underlying hazardous constituents (UHCs). The Agency has determined that these conclusions also apply to TC metal contaminated debris. In addition, the other debris treatment technologies set out in 268.45 are widely available.

For TC metal contaminated soils, the Agency believes that the treatment standards, ten times UTS or 90% reduction, will not result in any capacity problems for treating metals since most soils are already meeting these standards and, furthermore, there is an excess of stabilization treatment capacity. Additionally, for treating organics to the alternative treatment standards, sufficient treatment capacity exists from use of other technologies (e.g., thermal desorption, soil washing, biotreatment).

To allow facilities time to determine whether their wastes are affected by this rule and identify and locate alternative treatment capacity if necessary, EPA is providing 90 days between the publication of today's rule and the effective date of the treatment standards for the TC metal wastes, including soil and debris, covered by today's rule. For a detailed discussion on data sources, methodology, and comments and responses for these wastes, see the Capacity Background Documents.

D. Required Capacity and Variance Determination for Surface Disposed Mineral Processing Wastes

EPA estimates that the maximum quantity of newly identified mineral processing wastes potentially requiring alternative treatment is approximately 1.9 million mt/yr. Most of these wastes (approximately 1.8 million mt/yr) are already being treated to nonhazardous levels and, therefore, are not expected to require much, if any, additional treatment. The remaining wastes, approximately 71,000 mt/yr, will require treatment to meet the treatment standards. However, adequate on-site and off-site treatment capacity is available for these wastes. The Agency has determined that these conclusions also apply to debris contaminated with mineral processing wastes. In addition, the other debris treatment technologies set out in 268.45 are widely available. For soils contaminated with mineral processing wastes, the Agency believes that the treatment standards, ten times UTS or 90 percent reduction, will not result in any capacity problems. Nevertheless, to allow time for activities such as treatment system modifications or to identify and locate alternative treatment capacity for process wastes, soil, and debris, EPA is providing 90 days between the publication of today's rule and the effective date of the treatment standards for the mineral processing wastes, contaminated soil (including MGP soil; see discussion below), and debris covered by today's rule (one exception is the elemental phosphorus wastes; see discussion below). For a detailed discussion on data sources, methodology, and comments and responses for these wastes, see the Capacity Background Documents.

EPA estimates that up to 1.2 million mt/yr of soil contaminated with ''de-Bevilled'' wastes may be remediated from historic manufactured gas plant (MGP) sites. In response to the first supplemental proposal, several commenters stated that more than 50 percent of the MGP remediation sites are currently co-burning the wastes in on-site coal-fired utility boilers and requested the Agency to allow co-burning of MGP soils in coal-fired utility boilers and exclude them from RCRA requirements. In today's rulemaking, the Agency is confirming its existing (and not reopened) 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 section 266.112). In addition, as discussed elsewhere in this notice, the Agency is promulgating treatment standards (ten times UTS or 90 percent reduction) for contaminated soils. On-site treatment and existing commercially available treatment technologies can readily achieve—and to a large extent are already achieving—the treatment standards for contaminated MGP soil. Therefore, the Agency does not anticipate any capacity problems. To allow facilities time to determine whether their wastes are affected by this rule, to identify alternative treatment capacity if necessary, and to make contractual arrangements for transportation and other logistics, EPA is providing 90 days between the publication of today's rule and the effective date of the treatment standards for MGP soils.

In the first supplemental proposed rule, the Agency identified the following three waste streams generated from elemental phosphorus production as lacking sufficient commercial treatment capacity: Medusa scrubber blowdown, Anderson filter media rinsate, and furnace building washdown. A major generator of these waste streams, the FMC Corporation's Pocatello, Idaho facility, provided a substantial amount of data to show that these waste streams pose unique treatability problems (e.g., due the presence of naturally occurring radioactive materials (NORM)) and that a two-year national capacity variance is needed to develop and construct treatment capacity. After careful review of the data, EPA discussed in the May 10, 1996 Notice of Data Availability, the possibility of a two-year national capacity variance for these three large volume wastewater streams. In May 1997, EPA proposed the second supplemental Phase IV rule (62 FR 26041) and, in response to this proposal, FMC submitted a comment to EPA with new information identifying three other waste streams (NOSAP slurry, precipitator slurry, and phossy water) at its Pocatello, Idaho facility that FMC believes would be subject to Phase IV LDR requirements. FMC requested that a two-year national capacity variance also be granted for these three new waste streams. Like the original waste streams, the three newly identified streams are generated in the elemental phosphorous production process and contain varying amounts of both NORM and elemental phosphorous. FMC also noted that the AFM Rinsate waste stream, for which FMC originally requested a national capacity variance, has been completely eliminated, and that therefore a national capacity variance would no longer be needed for this waste stream. The Agency made these additional data available for public comment in a November 10, 1997 NODA (62 FR 60465). No adverse comments were received. The Agency has decided to grant a two-year capacity variance for all five FMC wastestreams.

Details of the methodology and estimates of affected facilities and waste quantities for the newly identified mineral processing wastes are provided in the Capacity Background Documents.

E. Phase IV Mineral Processing and TC Metal Wastes Injected Into Underground Injection Control (UIC) Class I Wells

Summary: EPA is granting a two-year capacity variance for UIC wells that inject newly identified mineral processing wastes from titanium dioxide production.

There are approximately 272 Class I injection well facilities nationwide. The Agency identified approximately 46 of those facilities as potentially injecting Phase IV wastes. These injected Phase IV wastes account for less than 15 percent of the total injectate being managed by Class I wells annually. Most of these facilities potentially identified already have approved no-migration petitions. In assessing the impact of the Phase IV rule to operators of UIC facilities, the Agency found that the only potentially affected wells are those injecting newly identified characteristic mineral processing wastes, since other characteristic wastewaters were already prohibited in 1990 and the period for possible capacity extensions for these wastes has run out. (See UIC background document explaining in detail why the other wastes are unaffected.)

For a facility with an existing approved no-migration determination, the facility operator may have already incorporated the subject waste in the original petitions. Any facility with an approved no-migration determination without the waste already incorporated may submit a modified petition (40 CFR Part 148.20 (f)). However, if an injection well has received a no-migration determination, it can inject a newly prohibited waste only if the waste is similar to wastes included in the initial no-migration petition. The new wastes must behave hydraulically and chemically in a similar manner to those already included in the initial petition demonstration such that they will not interfere with the containment capability of the injection zone and the location of the waste plume will not significantly differ from the initial demonstration (See 40 CFR 148.20 (f) & UIC Program Guidance # 74)). Based on this information, promulgation of the Phase IV LDRs should have little impact on any facilities with approved petitions.

EPA estimates that approximately five million tons of mineral processing wastes are being disposed annually in UIC wells. Of these, approximately three million tons are attributable to titanium dioxide production from two DuPont facilities. This volume is a conservative estimate based on highly complex, non-segregable waste stream mixtures. This total volume would be subject to the LDR treatment standards. Titanium dioxide (TiO2) production wastes are either generated onsite at facilities with injection wells, or at facilities without injection. For these DuPont facilities, this waste is generated and disposed onsite by injection wells. In order for these facilities to continue injection of this restricted waste, a no-migration petition must be approved to meet the conditions of 40 CFR Part 148.20 of the UIC regulations.

For those facilities disposing restricted Phase IV TiO2 mineral processing waste, their options may be limited to meeting treatment standards (onsite or offsite), submitting a no-migration petition, transporting their waste to a commercial Class I hazardous disposal well facility, or deactivating (diluting) the waste to make it nonhazardous before injection (see RCRA section 3004 (g) (9), a recent amendment which allows such dilution). All of these options are resource intensive and owners/operators of these facilities will be faced with critical economic and business decisions. These TiO2 facilities do not have immediate capability to treat their waste onsite. If they were to opt for treatment onsite, it would require substantial time and resources to build a treatment facility or to substantially modify their existing facility. It would take at least two years (and possibly longer) to construct such a treatment system. In evaluating various disposal alternatives, one DuPont facility is currently constructing a treatment works that will integrate a neutralization project based on current production. As an alternative to deep well injection disposal, the long term construction at this facility has been costly and operational start-up will require additional time to work out issues. See DuPont letter of Feb. 5, 1998.

With respect to the options of managing the waste water offsite, severe practical constraints limit the availability of capacity to these DuPont Ti02 facilities. A typical volume of Ti02 wastewater is 900,000 Gallons (3,750 tons) per day; and peak production volumes are 1 million Gallons (4,167 tons) per day. DuPont letters of Feb. 5 & 20, 1998. At peak production, this would take 200 tanker trucks per day for each affected facility to ship the volume of waste that is currently injected. Additionally, these trucks must be constructed with fiberglass or titanium tanks to be compatible to the low pH-highly corrosive acid waste (Note from ICF to R. E. Smith to RCRA Docket (Feb. 17, 1998)). Indeed, it is not even certain that existing 10, 000 gallon tanker trucks are compatible with this wastestream, due to its weight (the TDS content is so high that a 10, 000 gallon tanker could only be half full) and corrosivity. Dupont letter of Feb. 20, 1998.

Commercial waste management facilities normally cannot feasibly accommodate this daily volume. There are at least ten operating commercial Class I hazardous waste injection facilities nationwide, it is uncertain whether they have the capacity to accept 3 million tons of TiO2 mineral processing waste annually for disposal because of permitting limitations. These commercial wells also have finite capacity limitations. The Agency studied the operational permit parameters of these commercial facilities and found that individual injection and flow capacity rates (UICWELLS Database) may restrict injection of additional high volumes of waste. Rates are scientifically and mathematically determined to avoid damage to the well and the injection zone. Further study of compatibility requirements for these wells suggest that they have acceptable construction for most wastes disposed but not necessarily for the TiO2 production waste in its present concentration. Without pretreatment, these waste characteristics would require a more exotic well construction that is composed of fiberglass injection tubing, titanium casing and packer, epoxy and acid resistance compatible cement.

EPA has also looked at commercial wastewater treatment capacity in the vicinity of the two DuPont facilities. For one facility, there are no available commercial waste water treatment plants within 200 miles. For the other facility, there are two treatment plants within 75 miles but neither has the capacity to accept the high volumes of waste generated by either DuPont facility (based on BSR data). Commercial waste water treatment facilities generally handle corrosive toxic metal waste waters by stabilization and neutralization techniques. Treatment plants managing the Ti02 production waste waters would have to be specially constructed and equipped not only to be amenable to a high volume of acidic waste but also have the capacity to manage the huge amount of solids that will yield from treatment. Thus, wastewater treatment requires having pre-storage and processing units, adequate chemicals to neutralize the corrosive characteristic of the waste and stabilization technology to immobilize the metals before they are either stored onsite, marketed, or landfilled. While the Agency is satisfied that this treatment technology is applicable to Ti02 waste water, there is much reservation whether DuPont's facilities could realistically mobilize 200 tanker trucks per day per facility to safely ship this waste to these treatment facilities even if treatment capacity were readily available at them.

The statute also allows injection of waste waters which no longer exhibit a characteristic into Class I wells without meeting any other LDR treatment standard, and dilution may be used as a means of decharacterizing the waste. RCRA section 3004 (g) (9). However, deactivation of certain characteristic wastes through dilution is not always practical or even feasible. The whole waste stream process may not be amenable to dilution prior to injection at the wellhead, and the geologic reservoirs into which the wells inject have a finite capacity. Sometimes filling up reservoirs with huge volumes of additional water shortens the life of the well operation because reservoir pressures build up much more quickly and the injection zone becomes ''overpressurized.'' EPA finds that this is the case for the TiO2 wastewater at issue here. Thus, the dilution option cannot be utilized here to find that there is adequate available treatment capacity for these TiO2 wastes.

Capacity analyses usually focus on the demand for alternative capacity once existing on-site capacity and captive off-site capacity have been accounted for. However, capacity also may be unavailable if there is no practical means of utilizing it due to logistical problems. For example, in the Third Third rule, EPA relied on such logistical factors to determine when capacity was realistically available (see 55 FR 22645–22646, June 1, 1990). The Agency noted that injection wells at on-site facilities are directly connected to the plant operations and that in order to realistically arrange for off-site disposition of the waste, the plant managers will need time to make considerable logistical adjustments such as, repiping, retooling, and development of transportation networks at the plant operations. Similarly, for TiO2 waste facilities, the Agency doesn't believe that treatment capacity is available since there is no feasible way for generators to transport their wastes to the treatment facilities at this time, plus all of the other repiping that would be entailed. The Agency believes that it would take at least two years for the TiO2 facilities to alter their operations to ship wastewater to offsite facilities and for off-site facilities to make corresponding changes to their operations to accommodate the large influx of highly corrosive, high volume, dense wastewater (even if off-site facilities were to be willing to accept the waste, which is quite unclear).

Under these circumstances, the Agency finds that there is inadequate treatment, recovery, or disposal capacity presently available for TiO2 injected waste waters currently being injected into Class I hazardous wells, and therefore is granting a two-year national capacity variance for these wastes. The Agency expects that affected generators will utilize this period for applying for no-migration petitions for their existing wells, or to construct on-site wastewater treatment systems.

EPA estimates that there is approximately 2 million tons of other injected Phase IV mineral processing wastes (i.e. from processes other than TiO2 production). One facility with the largest volume of that injected waste has applied for and received an approved no-migration petition thus meeting the conditions of 40 CFR Part 148.20. The rest of these facilities are either applying dilution as a means of decharacterizing their waste (as allowed under Section 3004(g)(9)), or are treating their waste before disposal. Their waste volumes are much less than the TiO2 production waste being injected. Since the volume of wastes is so much less than TiO2, and the wastes are more amenable to conventional management, EPA does not see the same types of difficulties arising, and is therefore not delaying the effective date of the prohibition for these facilities. (See UIC background document).

F. Mixed Radioactive Wastes

Significant uncertainty exists about quantities of mixed radioactive wastes containing wastes that will require treatment as a result of today's rule. Despite this uncertainty, 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 therefore is granting a two-year national capacity variance for mixed RCRA/radioactive TC metal wastes that are newly identified (i.e., wastes, soil, or debris identified as hazardous by the TCLP but not the EP), and newly identified characteristic mineral processing wastes including soil and debris.

G. Summary

Table 1 summarizes the capacity variance determination for each category of Phase IV RCRA wastes for which EPA is promulgating LDR treatment standards.

TABLE OF CAPACITY VARIANCES FOR PHASE IV WASTES

[Note: Capacity variances begin from the publication date]

Waste description	Surface-disposed wastes	Deep well-injected wastes
Newly identified wastes from elemental phosphorus processing	Two years	Not applicable.
Newly identified mineral processing wastes from titanium dioxide production	90 days	Two years.
Newly identified TC metal wastes (i.e., wastes identified as hazardous by the TCLP but not the EP), and newly identified characterisitc mineral processing wastes including soil and debris.	90 days	90 days.
Radioactive wastes mixed with newly identified TC metal wastes (i.e., wastes identified as hazardous by the TCLP but not the EP), and mixed with newly identified characteristic mineral processing wastes, including soil and debris.	Two years	Two years.

X. Change to Definition of Solid Waste To Exclude Wood Preserving Wastewaters and Spent Wood Preserving Solutions From RCRA Jurisdiction

Summary: As proposed on May 12, 1997 (FR 62 26055), EPA is today amending the definition of solid waste to exclude wood preserving wastewaters and spent wood preserving solutions from RCRA jurisdiction provided that certain conditions are met, as specified below.

A. Summary of the Proposal

On May 12, 1997 in the Phase IV LDR second supplemental rulemaking, EPA proposed to amend the RCRA regulations to provide an exclusion from the definition of solid waste for certain materials generated and recycled by the wood preserving industry. Specifically, the proposal would exclude certain wood preserving wastewaters and spent wood preserving solutions from classification as solid waste under RCRA. Any wood preserving plant claiming the exclusion for these wastes would need to manage them according to the following criteria: (1) the materials must be recycled and reused on-site in the production process for their original intended purpose; (2) the materials must be managed to prevent release; (3) the plant must assure that the units managing these materials can be visually or otherwise determined to prevent releases; and (4) drip pads managing these materials must comply with Subpart W drip pad standards regardless of whether the plant has been classified as a conditionally exempt small quantity generator (CESQG) (see 40 CFR 261.5). For a more detailed discussion of these conditions, please consult the relevant sections in the May 12, 1997 proposed rule.

As noted above, the exclusion was to be limited to wood preserving wastewaters and spent wood preserving solutions that are recycled and reused on-site at wood preserving plants in the production process for their original intended purpose. As EPA explained in the proposal, any listed wastewater or spent solution that is not recycled on-site according to the conditions of the exclusion is not excluded from the definition of solid waste. Moreover, the F032, F034 and F035 listings cover wastestreams other than wastewaters and spent solutions. These other listed wastestreams would not be eligible for exclusion even if recycled. This could include materials associated with wastewaters and spent solutions, such as residues that accumulate in a drip pad sump. EPA affirms this scope of the exclusion for the final rule.

It was neither the Agency's intent nor belief that the proposed exclusion would in any way reduce the obligations that wood preserving plants have under 40 CFR Part 264, Subpart W and Part 265, Subpart W, including the requirements for drip pads and the § 264.570(c) and § 265.440(c) requirements under for response to infrequent and incidental drippage in storage yards. The Agency specifically requested comment on whether the proposed exclusion would reduce these requirements. The Agency also sought comment on whether a plant claiming the proposed exclusion should be required to place a notification form to that effect in its files on-site and/or to submit it to either the EPA Regional Administrator or State Director to allow review. Finally, EPA asked for comment concerning the conditions under which the proposed exclusion, once claimed, would no longer apply.

Of course, this exclusion from the definition of solid waste under the federal RCRA statute does not modify any regulatory requirements that are independently imposed under other environmental statutes.

B. Modifications to the Proposal

The Agency received four sets of comments on the proposed exclusion for wood preserving wastewaters and spent wood preserving solutions. While some comments were supportive of the proposal, others were critical of the Agency for, among other things, relinquishing some regulatory oversight of the wood preserving industry. The comments EPA received on the scope of the proposed exclusion and the Agency's response can be found in the docket for this rulemaking. All comments were carefully considered. This section addresses those changes that EPA made to the proposed rule based on comments the Agency received. The next section (''Other Comments'') addresses those aspects of the proposal that, though they remain unchanged by today's rule, require further clarification based on the comments received.

1. Notification

EPA received two responses to its request for comment on whether it was necessary for a plant claiming the proposed exclusion to provide notice to the appropriate regulatory agency and, if so, what type of notice that should be. One commenter suggested that the publication of the exclusion and its effective date by EPA in this final rule would serve as sufficient notice, and that notification on a plant specific basis is unnecessary. EPA does not consider publication of the final rule to provide adequate notice on the names and locations of wood preserving plants planning to operate under the conditional exclusion. Moreover, EPA is concerned that this commenter may have assumed that the exclusion would take effect nationwide upon publication. As explained below in the section titled ''state authorization,'' this is not correct. The exclusion will not take effect in any authorized state unless and until the state adopts it.

The other commenter suggested that it is appropriate for wood preserving plants claiming an exclusion for their recycled wastewaters and spent solutions to notify the appropriate state agency. EPA considers notification to the appropriate regulatory agency to be essential to the proper implementation of this provision. To allow EPA and authorized states to verify that the conditions placed upon today's exclusion are properly met, it is important that wood preserving plants inform the appropriate Regional Administrator or State Director that they are claiming the exclusion and will therefore be reporting significantly lower waste generation totals. EPA is therefore revising the proposed exclusion to require a plant owner or operator (prior to operating pursuant to this exclusion) to submit to the appropriate Regional Administrator or State Director a one-time notification stating that the plant intends to claim the exclusion, giving the date on which the plant intends to begin operating under the exclusion, and containing the following language: ''I have read the applicable regulation establishing an exclusion for wood preserving wastewaters and spent wood preserving solutions and understand it requires me to comply at all times with the conditions set out in the regulation.'' The plant must maintain a copy of that document in its on-site records for a period of no less than 3 years from the date specified in the notice.

2. Conditions Under Which the Exclusion Would No Longer Apply

EPA requested comment on conditions that void the exclusion. Specifically, EPA asked whether a spill should result in the loss of the exclusion just for the spilled material, or also for the wastewaters and spent solutions generated after the spill occurred. EPA received two comments on conditions under which the exclusion, once claimed, would no longer apply. One commenter stated that RCRA regulation should be required for all materials that are spilled or otherwise exit the recycling loop. The other commenter suggested that ''a simple spill . . . is obviously not related to the normal operation of the drip pad . . .'' and should therefore not void the exclusion for wastewaters and spent solutions that are collected and not spilled or released.

EPA agrees with the commenter who took the position that the spilled material itself should be ineligible for the exclusion. The spilled material inherently fails to meet the condition requiring plant operators to manage wastewaters and solutions so as to prevent releases. Although there could potentially be conditions under which a spilled material could still be eligible for the existing exclusions under § 261.4(a)(9)(i) and (ii) following reclamation, such materials are in all cases ineligible for today's new exclusion under § 261.4(a)(9)(iii).

To respond to the second comment, EPA has decided to clarify the effect of a violation of any condition, including the condition prohibiting spills, on wastewaters and spent solutions generated after a violation occurs. EPA has decided that the exclusion should not be available until the plant owner or operator notifies the appropriate regulatory agency, and the agency determines that the problem has been adequately addressed. It is appropriate to impose this requirement even for spills, because the significance of a spill may vary greatly from plant to plant and from incident to incident. EPA hopes that a reviewing agency would quickly reinstate the exemption after a one-time spill, particularly if small, and would not require specific actions to correct the problem. In contrast, EPA would expect the reviewing agency to require specific actions (such as creation and implementation of a spill prevention plan) for a plant that experienced repeated spills. EPA believes the severity of any violation and the precise actions needed to return the plant to compliance can best be assessed on a case-by-case basis. EPA has added language to the regulation to clarify this issue. It applies to all of the conditions of the exclusion.

C. Other Comments

A number of comments indicated a need for EPA to clarify other aspects of the proposal that the Agency is finalizing today.

1. Oil Borne Facilities

One commenter suggested that the exclusion that EPA is finalizing today applies not only to water borne wood treating plants but also to oil borne wood treating plants. At the time of proposal, EPA intended to create an exclusion only for plants using water borne preservatives. See, for example, the discussion at 63 FR 26057, col. 1. EPA did not evaluate oil borne plants at the time. It is EPA's general understanding that plants which use oil borne preservatives do not recycle wastewaters and spent solutions by using them in the work tank to treat wood. Rather, they reuse these wastewaters in cooling systems, vacuum seals, and other devices. EPA wants to limit today's exclusion to materials that are reused for their original intended purpose—the treatment of wood. EPA has not had time to investigate the jurisdictional and factual issues posed by the use of wastewaters for other, more ancillary purposes. Consequently, EPA is not expanding the exclusion beyond the proposal. It applies only to water borne processes.

2. Application of the Conditions to Units Other Than the Drip Pad

One commenter expressed opposition to ''any language that would extend the EPA's RCRA authority to devices that have previously not been regulated under RCRA.'' In view of this comment, the Agency is prompted to clarify that the conditions for claiming the exclusion must be met with regard to any unit that comes into contact with the recycled wastewaters and spent wood preserving solutions excluded in today's rule.

Thus, sumps or other units that are arguably part of an exempt wastewater treatment unit and that manage wastewaters and spent solutions are subject to these conditions. EPA has already stated that ''management to prevent releases would include, but not necessarily be limited to, compliance with [Subpart W] and maintenance of the sumps receiving the wastewaters and spent solutions from the drip pad and retort to prevent leaching into land and groundwater.'' (62 FR 26057). The Agency must be able to verify that the excluded materials are being managed to prevent release at every step of the recycling process through reclamation to ensure that the basic technical and policy conditions underlying the exclusion are properly met.

3. Relationship of Today's Exclusion to Previous Industry Exclusions

One commenter wanted to assure that today's exclusion would not now regulate units that transmit or store materials that have been excluded according to other, currently existing regulations. EPA does not intend to use today's exclusion to rescind either of the exclusions that the Agency has previously granted the wood preserving industry under §§ 261.4(a)(9)(i) and (ii).

4. Units That May Be Visually or Otherwise Determined to Prevent Release

One commenter expressed concern that the term ''units'' is an overly broad way to refer to those portions of the system subject to RCRA inspection. EPA will now clarify which ''units'' are subject to inspection under the conditions of this exclusion. As mentioned above, all units that come into contact with the excluded materials prior to reclamation must necessarily be subject to verification that they are able to contain these materials in a manner that prevents their release to the environment. This includes, but is not necessarily limited to, any drip pad, sump, retort or conduit that comes into contact with the wastewaters and spent solutions prior to reclamation. This also includes any unit that is arguably part of a plant's wastewater treatment system but that comes into contact with the wastewaters or spent solutions prior to reclamation. An inspector must be able to determine (by visual or other means) whether these units are managing the wastewaters and spent solutions in a manner that prevents release. When relying on a visual inspection (as opposed to a leak detection system or other means), it may be necessary for an inspector to require these units be drained or cleaned for the inspector to make an informed determination as to whether the unit is cracked or leaking.

5. CESQG Status

One commenter also requested EPA to prevent wood preserving plants from becoming conditionally exempt small quantity generators (CESQGs) after claiming the exemption. The commenter was concerned that other, non-excluded wastestreams generated at these plants that are covered by the listings would no longer be subject to any hazardous waste regulation. As explained in more detail in the response to comment document, EPA lacks sufficient information about the volumes of these other wastes and the risks they pose to promulgate a rule creating an exception to the long-established CESQG exemption for them.

D. State Authorization

Upon promulgation, this exclusion will immediately go into effect only for plants in those states and territories that are not currently authorized to implement the RCRA program (i.e., Alaska, Iowa, Hawaii, American Samoa, Northern Mariana Islands, Puerto Rico and Virgin Islands). Plants in these states are subject to the provisions of the federal program. Conversely, any plant located in a RCRA authorized state will be unable to claim the exclusion we are finalizing today unless and until that state amends its regulations to include the exclusion. Because EPA allows state programs to be more stringent than the federal program, it is not necessarily guaranteed that all authorized states will elect to adopt this exclusion.

XI. Clarification of the RCRA Exclusion of Shredded Circuit Boards

In the May 12, 1997 final rule on Land Disposal Restrictions, the Environmental Protection Agency (EPA) excluded shredded circuit boards from the definition of solid waste conditioned on containerized storage prior to recovery. To be covered by this exclusion shredded circuit boards must be free of mercury switches, mercury relays, nickel-cadmium batteries or lithium batteries. On a related issue, current Agency policy states that *whole* circuit boards may meet the definition of scrap metal and therefore be exempt from hazardous waste regulation. In a parenthetical statement in the May 12, 1997 rule, the Agency asserted that whole used circuit boards which contain mercury switches, mercury relays, nickel-cadmium batteries, or lithium batteries also do not meet the definition of scrap metal because mercury (being a liquid metal) and batteries are not within the scope of the definition of scrap metal. The preamble cited 50 FR 614, 624 (1985).

Members of the electronics industry expressed concern to the Agency about the preamble statement regarding the regulatory status of whole used circuit boards which contain mercury switches, mercury relays, nickel-cadmium batteries, or lithium batteries. The electronics industry indicated that its member have developed a sophisticated asset/materials recovery system to collect and transport whole used circuit boards to processing facilities. The industry explained that the boards are sent to processing facilities for evaluation (continued use, reuse or reclamation) where the switches and the types of batteries are generally removed by persons with the appropriate knowledge and tools for removing these materials. Once these materials are removed from the boards, they become a newly generated waste subject to a hazardous waste determination. If they fail a hazardous waste characteristic, they are handled as hazardous waste, otherwise they are managed as a solid waste. Information was also provided regarding the quantity of mercury on these switches and on the physical state in which they are found on the boards. The information indicates that the mercury switches and relays on circuit boards from some typical applications contain between 0.02–0.08 grams of mercury and are encased in metal which is then coated in epoxy prior to attachment to the boards.

In today's final rule, the Agency recognizes that the preamble statement in the May 12, 1997 final rule is overly broad in that it suggested that the scrap metal exemption would not apply to whole used circuit boards containing the kind of minor battery or mercury switch components and that are being sent for continued use, reuse, or recovery. It is not the Agency's current intent to regulate under RCRA circuit boards containing minimal quantities of mercury and batteries that are protectively packaged to minimize dispersion of metal constituents. Once these materials are removed from the boards, they become a newly generated waste subject to a hazardous waste determination. If they meet the criteria to be classified as a hazardous waste, they must be handled as hazardous waste, otherwise they must be managed as a solid waste.

XII. Regulatory Requirements

A. Regulatory Impact Analysis Pursuant to Executive Order 12866

Executive Order No. 12866 requires agencies to determine whether a regulatory action is ''significant.'' The Order defines a ''significant'' regulatory action as one that ''is likely to result in a rule that may: (1) have an annual effect on the economy of $100 million or more or adversely affect, in a material way, the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.''

The Agency estimated the costs of today's final rule to determine if it is a significant regulation as defined by the Executive Order. The analysis considered compliance costs and economic impacts for newly identified wastes affected by this rule, as well as media contaminated with these wastes. In addition, the analysis addresses the cost savings associated with the new soil treatment standards being promulgated in today's rule. Newly identified mineral processing wastes covered under this rule include 118 mineral processing wastes identified as potentially characteristically hazardous. Also covered under this rule are TC metal wastes. Today's final rule also covers treatment standards for contaminated media (i.e., soil and sediment). EPA estimates the total cost of the rule to be a savings of $6 million annually, and concludes that this rule is not economically significant according to the definition in E.O. 12866. However, the Agency does consider this rule to be significant for novel policy reasons. The Office of Management and Budget has reviewed this rule.

Detailed discussions of the methodology used for estimating the costs, economic impacts and the benefits attributable to today's proposed rule for newly identified mineral processing wastes, followed by a presentation of the cost, economic impact and benefit results, may be found in the background documents: (1) ''Regulatory Impact Analysis of the Phase IV Land Disposal Restrictions Final Rule for Newly Identified Mineral Processing Wastes,'' (2)''Regulatory Impact Analysis of the Phase IV Land Disposal Restrictions Final Rule for TC Metal Wastes,'' and (3) ''Regulatory Impact Analysis of the Phase IV Land Disposal Restrictions Final Rule for Contaminated Media,'' which were placed in the docket for today's final rule.

1. Methodology Section

The Agency estimated the volumes of waste and contaminated media affected by today's rule to determine the national level incremental costs (for both the baseline and post-regulatory scenarios), economic impacts (including first-order measures such as the estimated percentage of compliance cost to industry or firm revenues), and benefits or risk-screens used to document the inherent hazard of materials being evaluated.

2. Results

a. Volume Results. EPA estimates that there are 29 mineral commodity sectors potentially affected by today's rule, including an estimated 136 facilities that generate 118 streams of newly identified mineral processing secondary materials. The estimated volume for these potentially affected newly identified mineral processing secondary materials is 22 million tons. Also, approximately 1.3 million tons of contaminated soil containing coal tar and other wastes from manufactured gas plants are potentially affected by this rule. As discussed below, EPA does not believe that any TC metal process wastes are potentially affected by today's final rule. EPA estimates that approximately 165,000 tons per year of soil and sediment contaminated with TC metals and approximately 90,000 tons per year of previously regulated contaminated soils is impacted by today's rule.

b. Cost Results For the part of today's final rule that prohibits land storage of mineral processing residues (below the high volume threshold) prior to being recycled, EPA estimates these expected case annualized compliance costs to be $10 million. The cost results for this part of today's final rule are a function of two factors: (1) the expense associated with purchasing new storage units or upgrading existing storage units, and (2) the transfer of some mineral processing residues either from recycling to disposal resulting in increased costs or from disposal to recycling resulting in a cost savings.

For TC metal wastes the Agency believes that there will be no incremental costs associated with stabilization of these wastes from the promulgation of these treatment standards.[47] In addition, EPA believes

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[47] One possible exception to this are producers of hazardous waste-derived fertilizers. This is

that there will be no incremental treatment costs for the treatment of TC metal wastes that contain organic underlying hazardous constituents. Based on public comment and data collected from commercial hazardous waste treaters and generators, EPA believes that TC metal wastes are often already treated to these universal treatment standard levels when waste handlers treat to the current treatment standards using bona fide treatment reagents (e.g., portland cement).[48] Therefore, no additional treatment reagent or capital equipment associated with stabilization is required with these wastes.

Previously, EPA had estimated costs to the nonferrous foundry industry associated with complying with today's treatment standards. This estimate was modeled on trisodium phosphate with a ph buffer. When this type of treatment reagent is used, incremental quantities are required to achieve the universal treatment standards for cadmium promulgated in today's rule. However, based on contacts with trade associations and vendors of stabilization equipment, EPA believes that portland cement is equal to or less than the cost of trisodium phosphate and is therefore a more appropriate choice for modeling a compliance baseline from which to estimate the costs of the rule. Unlike trisodium phosphate, portland cement currently being used to meet existing treatment standards has been shown to meet the universal treatment standards without additional reagent. Accordingly, EPA believes that no incremental costs (or benefits) for stabilization are attributable to the promulgation of the universal treatment standards for TC metal wastes.

Although according to the American Foundrymen's Society iron filings are used by many nonferrous foundries as a treatment reagent, for the reasons discussed above under Section III (f), EPA does not believe that iron filings are a legitimate and effective form of treatment. Therefore, the costs of switching from iron filings to another form of treatment reagent such as portland cement is more appropriately characterized as a cost of coming into compliance with already existing treatment standards rather than an incremental cost attributable to today's rule. Although EPA does not believe the cost of switching from iron filings to another treatment reagent is attributable to today's final rule, the Agency has estimated these compliance costs and included this information in the background document ''Regulatory Impact Analysis of the Phase IV Land Disposal Restrictions Final Rule for TC Metal Wastes,'' which was placed in the docket for today's final rule. EPA estimates that the annual cost to nonferrous foundries to switch from iron to portland cement to stabilize hazardous foundry sands is $11.7 million. Results from the risk screen for nonferrous foundry sands are discussed below.

For TC metal hazardous wastes that contain organic underlying hazardous constituents, one commenter has suggested that the Phase IV final rule would result in costs resulting from changing from stabilization of these wastes to incineration. EPA has evaluated data from the National Hazardous Waste Constituent Survey to assess both the prevalence and level of organic underlying hazardous constituents in TC metal wastes (solid and sludges). The results indicate that organic underlying hazardous constituents are rarely present in these wastes. Only seven of 181 TC metal hazardous wastes examined contained organic underlying hazardous constituents. Of these seven, only three contained organics above the Univeral Treatment Standard. None of the three waste steams that contained organics above the Univeral Treatment Standard was present in concentrations high enough to warrant incineration. In short, it is unlikely that organic underlying hazardous constituents will be present in TC metal wastes. And if present, incineration is unlikely to be used to treat these wastes. For reasons, EPA believes that the Phase IV final rule will not result in incremental costs for TC metal wastes containing organic underlying hazardous constituents.

The Agency is also promulgating new soil treatment standards in today's final rule. As these standards are less stringent than those currently required for previously regulated soils, an estimate of the cost savings associated with these standards has been prepared. The total incremental savings estimated for the new soil treatment standards is $25 million per year.

For contaminated soils which exhibit a characteristic for TC metals (including soils containing newly identified mineral processing wastes) but do not contain organic underlying hazardous constituents, there is no incremental cost expected from today's rule. These soils are subject to the new treatment standards which are less stringent than current LDR treatment standards for contaminated soils. The one category of TC hazardous metal contaminated soil that is potentially impacted by today's rule is TC hazardous metal contaminated soil which contains organic underlying hazardous constituents. These soils require additional treatment over that received in the baseline to effectively treat the organic constituents of concern. The Agency estimates that this additional requirement will result in a $3 million per year cost for these wastes, occurring mainly at voluntary cleanups and Superfund sites.

Manufactured gas plant contaminated soils (MGP) are a class of contaminated media that has heretofore not been subject to LDR treatment standards. EPA believes that some incremental costs may result from today's final rule to MGP clean ups involving the use of MGP soils in land applied recycling such as hot or cold mix asphalt, brick and concrete. It is possible that some of these soils will not meet the conditional exemption for waste-derived products that are used in a manner constituting disposal. 40 CFR § 266.20(b). For this reason, it is also possible that owner/operators of these sites may select an alternative remedy such as in-situ treatment or co-burning which are not affected by today's rule. On balance, EPA still believes that the promulgation of new treatment standards will encourage remediation of hazardous soils. The estimated annual costs to owner/operators of MGP sites for selecting remedies that are alternatives to asphalt, brick or concrete recycling are $6.2 million.

c. Economic Impact Results. To estimate potential economic impacts resulting from today's final rule, EPA has used first order economic impacts measures such as the estimated compliance cost of the rule as a percentage of sales/revenues, value added (sales less and material cost) and profit or return on capital. EPA has applied these measures to newly identified mineral processing hazardous wastes.

For recycled mineral processing secondary materials, EPA has evaluated the estimated compliance costs as a percentage of value (i.e. sales), value added and profits of the mineral commodities produced in each sector. In addition EPA has compared estimated compliance costs as a percentage of revenues to specific mineral processing firms to provide additional information on potential impacts.

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discussed below under the Regulatory Flexibility section.

[48] December 19, 1996 letter to Anita Cummings, USEPA Office of Solid Waste from Michael G. Fusco, Director of Regulatory Analysis, Rollins Environmental Inc., p.4 of edited draft EPA trip report letter to Rollins Highway 36 facility in Colorado.

Economic impacts from today's rule for mineral processing facilities may or may not be substantial for selected mineral processing sectors depending on the actual storage and management of mineral processing residues prior to being recycled. In the expected case scenario up to 5 of the 29 commodity sectors are expected to incur compliance costs equal to or greater than 1 percent of the economic value of the mineral commodities produced under the Agency's proposed option in today's rule. These sectors include: cadmium, fluorspar and hydrofluoric acid, mercury, selenium and tungsten. The range of percentages in these sectors is between 2 percent (cadmium) and 36 percent (mercury). Because many of these sectors are actually co-processed with other mineral commodity sectors, these impacts may be distributed over the economic value of the other minerals, rather than concentrated solely on the mineral commodity associated with generating the secondary materials. For example, EPA has estimated that today's final rule may affect the cadmium and selenium sectors by imposing incremental costs equal to 18 percent of the value added of those minerals. The value added is equal to the market value of the minerals less the cost of the raw materials (i.e., ore concentrate). Cadmium is a co-product of zinc production and selenium is co-product of copper production; hence, these economic impacts are expected primarily to affect the production of these co-products and the reclamation of their residuals rather than the mineral processing operation as a whole. Because recovery for these co-product residuals is generally less expensive than treatment and disposal, EPA believes that the costs for these residuals will not significantly decrease their recovery although the storage costs could add to the expense.

As stated above, the Agency believes that there are no incremental costs associated with today's final rule for stabilization for handlers of TC metal hazardous wastes. Moreover, the Agency believes that there are no incremental costs associated with TC metal wastes containing organic underlying hazardous constituents may incur costs as described above and corresponding impacts. Accordingly, there is no economic impact for waste handlers managing TC metal wastes.

For TC hazardous foundry sands, EPA also believes that there is no economic impact attributable to today's final rule. As stated above, EPA views the cost associated from switching from iron filings to cement or other treatment reagent are not properly considered attributable to this rulemaking but rather a cost of coming into compliance with existing regulations. Moreover, even if these costs were attributable to this rulemaking, EPA estimates that incremental costs attributable to this switching from iron filings to portland cement are less than one percent of industry revenues and six percent of industry profits and therefore would not create a significant impact to these facilities. More detailed information on this estimate can be found in the regulatory impact analysis placed into today's docket.

As previously stated, EPA does not believe there are incremental costs associated with today's rule for TC hazardous metal contaminated soils except for TC hazardous metal contaminated soils that contain organic underlying hazardous constituents. EPA has evaluated the industries generating these TC metal organometallic soils and has determined that incremental costs from today's final rule do not impose a significant impact.

Similarly, EPA has determined for MGP site clean ups that the economic impact of today's rule is not a significant impact. The estimated percentage of compliance costs to firm sales is less than 1 percent.

d. Individual Risk Estimate Results. The Agency has performed an individual risk analysis to estimate the quantifiable central tendency and high-end hypothetical individual risk for mineral processing secondary materials associated with today's final rule to be above levels of concern for cancer and noncancer risks for specific mineral processing streams in both groundwater and nongroundwater pathways. Results suggest that central tendency and high-end hypothetical individual cancer and non-cancer risks may be decreased below 1×10^{-5} and below a reference dose ratio of 1 in a number of mineral processing facilities. These results are linked primarily with mineral processing liquid secondary materials stored in surface impoundments prior to reuse. The data used to calculate these results are based on the groundwater pathway as well as other potential routes of exposure such as air or surface water. The risk results indicate that the highest individual risks are associated with exposure through groundwater and surface water pathways. These results are also limited to a subset of the mineral processing universe being regulated today where the Agency has collected data from individual mineral processing facilities. EPA also notes that in completing these individual risk results that the entire mass of hazardous constituents available for release in the waste management unit was available for release through each pathway. This could result in overestimation in risks due to double counting of constituent mass. To address this factor, EPA conducted mass balance calculations for all non-groundwater release pathways. These calculations indicate that this potential overestimate would result in negligible bias because only a very small percentage of hazardous constituents in the waste mass is available for release. In addition, EPA did not conduct these mass balance calculations for the groundwater pathway because of limitations in the methodology for which individual groundwater risks were calculated. The Agency believes that the potential bias in risk results for both surface impoundments and waste piles is low.

As stated above the Agency's efforts to evaluate benefits for mineral processing secondary materials were limited to calculations for central tendency and high-end individual risk. However, due to data limitations, the Agency has been unable to evaluate additional more explicit risk-reduction benefits, including populations benefits. In general, the Agency's experience has been that it is unusual to predict high population risks, unless there is an unusually large water well supply impacted by the facility, because ground water contamination generally moves slowly and locally.

Although the regulatory impact analysis completed for today's rule does not address benefits associated with ecological risk reduction and a decrease in natural resource damages, based on a review of available information on damage incidents associated with mining and mineral processing operations [49], the Agency's experience is that, while these types of benefits are extremely difficult to quantify, this rule may produce benefits in the area of ecological risk reduction and reduced natural resource damage.

For TC metals, because the analysis shows that many handlers of TC metal wastes are already meeting the universal treatment standards being promulgated

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[49] See Human Health and Environmental Damages from Mining and Mineral Processing Wastes, Technical Background Document Supporting the Supplemental Proposed Rule Applying Phase IV Land disposal Restrictions to Newly Identified Mineral Processing Wastes, U.S. Office of Solid Waste, U.S. Environmental Protection Agency, December 1995; Ecological Risk Assessment Southshore Wetlands for the Kennecott Utah Copper Salt Lake City, Utah. Working Draft March 4, 1996; May 7, 1996 letter from Max H. Dodson, Assistant Regional Administrator for Ecosytem Protection and Remediation, U.S.E.P.A, Region VIII to Michael Sahpiro, Director, Office of Solid Waste, U.S.E.P.A.

in today's rule, EPA does not believe that there are either incremental costs or benefits associated with stabilization of these wastes. However, for TC hazardous nonferrous foundry sands, the Agency has completed a risk screening for groundwater releases of lead and cadmium resulting from the disposal of untreated or poorly treated sands in municipal solid waste landfills. The results of the screen indicate that the probability the lead and cadmium would exceed the action level for lead of 0.015 mg/l or the drinking water standard for cadmium of 0.005 mg/l for untreated foundry sands was approximately 9 percent for lead and 14 percent for cadmium. The risk results also showed that the probability for hazardous foundry sands treated to the universal treatment standard to exceed these standards were approximately 2 percent for lead and 7 percent for cadmium. Because of data limitations, EPA is not able to demonstrate population benefits associated with effective treatment of foundry sands. These risk results do, however, document the intrinsic hazard of the sands and the need for effective treatment of these sands. However, as indicated above, EPA would attribute any public health benefits associated with decreasing lead and cadmium concentrations from foundry sands leachate to coming into compliance with existing regulations rather than promulgation of today's universal treatment standards.

B. Regulatory Flexibility

The Regulatory Flexibility Act (RFA) generally requires an agency to conduct a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small not-for-profit enterprises, and small governmental jurisdictions. Based on the following discussion, this final rule will not have a significant impact on a substantial number of small entities.

With respect to mineral processing facilities that are small entities, EPA believes that today's final rule will not pose a significant impact to a substantial number of these facilities. EPA identified 22 firms owning 24 mineral processing facilities that are small businesses based on the number of employees in each firm. Under the Agency's proposed option, zero firms out of the 24 identified incurred estimated compliance costs that exceed 1 percent of reported firm revenues.

As discussed above in the cost and economic impact section on TC metal wastes, EPA has determined that treating TC metal wastes will not result in incremental costs to the regulated community. As stated above, data from commercial treaters and generators of TC metal wastes indicate that the wastes are already treated to below UTS levels. Moreover, today's rule will not result in increased costs from incinerating TC metal wastes with organic underlying hazardous constituents. EPA's review of data from commercial hazardous wastes treatment facilities indicates that TC metal wastes with organic underlying hazardous constituents are not prevalent and when present would rarely require incineration.

Finally, after the close of the public comment period, representatives of small business hazardous waste-derived fertilizer producers met with the Agency claiming economic hardship resulting from the Agency's proposed UTS for metal wastes. Under existing 40 CFR § 266.20(b) commercial fertilizers sold for public use must meet treatment standards in order to be placed on the land. Currently all such hazardous waste fertilizers (except for K061–derived fertilizers) are subject to treatment standards for metals at the characteristic level. Based on available information, the Agency has found that out of 10 secondary small business zinc fertilizer producers only two firms in the United States produce a hazardous waste-derived fertilizer, meet the definition of a small business and are subject to this today's rule. Considering a limited range of regulatory responses (such as switching from a hazardous to a non-hazardous source of zinc waste), EPA believes that only one of the two firms could potentially incur a significant economic impact. Because only one firm in this industry is potentially affected by today's rule, EPA does not consider this to be a substantial number of small entitities.

Additionally, there are incremental costs estimated to result from today's rule to facilities undergoing remediation of TC metal contaminated soils and sediments with organic underlying hazardous constituents. EPA estimates that between 34 and 93 small entities would be impacted by these costs. Two firms out of the 93 identified as an upper bound estimate incurred estimated compliance costs that exceed 1 percent of reported firm revenues. Therefore, I certify that this action will not have a significant economic impact on a substantial number of small entities.

C. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104–4, establishes requirements for Federal Agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under Section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with ''Federal mandates'' that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not include a Federal mandate that may result in estimated costs of $100 million or more to either State, local, or tribal governments in the aggregate. The rule would not impose any federal intergovernmental mandate because it imposes no enforceable duty upon State, tribal or local governments. States, tribes and local governments would have no compliance costs under this rule. It is expected that states will adopt similar rules, and submit those rules for inclusion in their authorized RCRA programs, but they have no legally enforceable duty to do so. For the same reasons, EPA also has determined that this rule contains no regulatory requirements that might significantly or uniquely affect small governments. In addition, as discussed above, the private sector is not expected to incur costs exceeding $100 million. EPA has fulfilled the requirement for analysis under the Unfunded Mandates Reform Act.

D. Paperwork Reduction Act

The information collection requirements in this rule have been submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. EPA has prepared an Information Collection Request (ICR) document: OSWER ICR No. 1442.15 would amend the existing ICR approved under OMB Control No. 2050–0085. This ICR has not been approved by OMB and the information collection requirements, although they are less stringent than those previously required by the EPA, are not enforceable until OMB approves the ICR. EPA will publish a document in the **Federal Register** when OMB approves the information collection requirements showing the valid OMB control number. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.

Copies of this ICR may be obtained from Sandy Farmer, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136); 401 M St., S.W.; Washington, D.C. 20460 or by calling (202) 260–2740. Include the ICR number in any request.

The Agency has estimated the average information collection burden of this final Phase IV rule to the private sector and the government. The burden of this final rule to the private sector is approximately 4,880 hours over three years, at a cost of $943,942. The burden to EPA is approximately 787 hours over three years, at a cost of $29,841. The term ''burden'means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information; process and maintain information and comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

Send comments on the Agency's burden reduction, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection of techniques to the Director, OPPE Regulatory Information Division; U.S. Environmental Protection Agency (2136); 401 M St., S.W.; Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th St., N.W., Washington, D.C. 20503, marked ''Attention: Desk Officer for EPA.'' Include the ICR number in any correspondence.

XIII. Environmental Justice

A. Applicability of Executive Order 12898

EPA is committed to address environmental justice concerns and is assuming a leadership role in environmental justice initiatives to enhance environmental quality for all residents of the United States. The Agencies goals are to ensure that no segment of the population, regardless of race, color, national origin, or income bears disproportionately high and adverse human health and environmental effects as a result of EPA's policies, programs, and activities, and all people live in clean and sustainable communities.

B. Potential Effects

Today's rule covers high-metal wastes (''TC metal wastes,'' hazardous mineral processing wastes, and mineral processing materials). The rule will possibly affect many facilities nationwide, with the potential for impacts to minority or low-income communities. Today's rule is intended to reduce risks to human health and the environment, and to benefit all populations. It is not expected to cause any disproportionate impacts to minority or low income communities versus affluent or non-minority communities.

XIV. State Authority

A. Statutory Authority

Under section 3006 of RCRA, EPA may authorize qualified States to administer and enforce the RCRA hazardous waste program within the State. Following authorization, EPA retains enforcement authority under sections 3008 (a)(2), 3013, and 7003 of RCRA, although authorized States have primary enforcement responsibility. The standards and requirements for authorization are found in 40 CFR Part 271.

Prior to the Hazardous and Solid Waste Amendments of 1984 (HSWA), a State with final authorization administered its hazardous waste program in lieu of EPA administering the Federal program in that State. The Federal requirements no longer applied in the authorized State, and EPA could not issue permits for any facilities that the State was authorized to permit. When new, more stringent Federal requirements were promulgated or enacted, the State was obliged to enact equivalent authority within specified time frames. New Federal requirements did not take effect in an authorized State until the State adopted the requirements as State law.

In contrast, under RCRA section 3006(g) (42 U.S.C. 6926(g)) new requirements and prohibitions imposed by HSWA take effect in authorized States at the same time that they take effect in unauthorized States. Although States are still required to update their hazardous waste programs, EPA is directed to carry out the HSWA requirements and prohibitions in authorized States, including the issuance of permits, until the State is granted authorization.

Authorized States are required to modify their programs only when EPA promulgates Federal requirements that are more stringent or broader in scope than existing Federal requirements. RCRA section 3009 allows the States to impose standards more stringent than those in the Federal program. See also 40 CFR 271.1(i). Therefore, authorized States can, but do not have to, adopt Federal regulations, both HSWA and non-HSWA, that are considered less stringent. Less stringent regulations, promulgated under both HSWA and non-HSWA authority, do not go into effect in authorized States until those States adopt them and are authorized to implement them.

B. Effect on State Authorization

Today's rule is promulgated in part pursuant to non-HSWA authority, and in part pursuant to HSWA. The more stringent HSWA portions of this rule will become effective at the same time in all states. The new LDR treatment standards for metal-bearing and mineral processing wastes are being promulgated pursuant to section 3004 (g)(4) and (m), provisions added by HSWA. (Note, however, that the treatment standards, even though they are promulgated pursuant to HSWA, will not apply to mineral processing wastes unless the wastes are currently included in the authorized State's definition of solid waste.) The application of the TCLP to mineral processing wastes likewise implements a HSWA provision, section 3001(g). These requirements are being added to Table 1 in 40 CFR 271.1(j), which identifies the Federal program requirements that are promulgated pursuant to HSWA, and would take effect in all States, regardless of authorization status. States may apply for final or interim authorization for the HSWA provisions in Table 1, as discussed in the following section of this preamble. Table 2 in 40 CFR 271.1(j) is also modified to indicate those provisions of this rule that are self-implementing provisions of HSWA. Note that there are other HSWA provisions that are not more stringent than the current program, such as the revisions to certain of the existing LDR treatment standards. These would not be implemented by EPA in those states authorized for the existing provisions prior to a State being authorized for them. These provisions are further discussed below.

Today's rule contains provisions, both under HSWA and non-HSWA authority, that are less stringent than the current Federal program. First is the non-HSWA provision which would allow mineral processing spent materials being reclaimed within the mineral processing industry sector, or in beneficiation processes, to be excluded from the definition of solid waste. This provision can be adopted at the States' option, although EPA strongly encourages States to adopt this provision. As stated earlier in the preamble, part of the purpose of this rule is to eliminate distinctions among reclaimed spent materials, by-products, and sludges within this industry. This change, in combination with the conditioned exclusion for the reclaimed byproducts and sludges, will result in more control over land-based mineral processing units than exists presently, encourage additional material recovery within the industry, properly control land-based storage of mineral processing industry secondary materials awaiting intra-industry recovery, and also simplify the solid waste regulatory classification scheme. In addition, State adoption of these provisions will provide national consistency.

Similarly, another less stringent non-HSWA provision in this rule excludes from RCRA regulation certain recycled wood preserving wastewaters and spent wood preserving solutions. The exclusion will not be effective in authorized States until they amend their regulations and received authorization. Although the States do not have to adopt these provisions, EPA strongly encourage them to do so, because the exclusion encourages properly conducted material recovery in the wood preserving industry.

Last, the treatment standards for soil contaminated with hazardous waste (and the associated site-specific risk based variance provision for contaminated soils), promulgated under HSWA, are less stringent than the existing treatment standards. Although the authority for these standards is under HSWA, EPA will not implement them in those States that are authorized for the existing standards because they are less stringent. EPA will implement them in those States that are unauthorized for the applicable existing treatment standards. However, EPA strongly encourages States to seek authorization for these standards in order to encourage and speed up cleanups of contaminated sites based on remedies involving treatment of contaminated soils, thus providing more permanent remedial solutions.

Some of today's regulatory amendments are neither more or less stringent than the existing Federal requirements. These are the revisions to the existing UTS numbers. EPA clarified in a December 19, 1994, memorandum (which is in the docket for today's rule) that EPA would not implement the Universal Treatment Standards (promulgated under HSWA authority in the Phase II LDR rule) separately for those States for which the State has received LDR authorization. EPA views changes from the existing limits to be neither more or less stringent since the technology basis of the standards has not changed. Accordingly, EPA will not implement today's amendments to the UTS in those States with authorization for the treatment standards.

Today's rule also clarifies the scrap metal exemption from solid waste as it applies to whole circuit boards. This part of the preamble simply clarifies the Agency's interpretation of the existing rules. If authorized for the scrap metal exemption, States do not need further authorization to interpret their rules in conformity with this interpretation.

C. Authorization Procedures

Because portions of today's rule are promulgated pursuant to HSWA, a State submitting a program modification for those portions may apply to receive interim authorization under RCRA section 3006(g)(2) or final authorization under RCRA section 3006(b), on the basis of requirements that are, respectively, substantially equivalent or equivalent to EPA's. For program modifications for the non-HSWA portions of this rule, States can received final authorization only. The procedures and schedule for final authorization of State program modifications are described in 40 CFR 271.21. It should be noted that all HSWA interim authorizations will expire January 1, 2003. (See 40 CFR 271.24(c) and 57 FR 60132, December 18, 1992.)

Section 271.21(e)(2) requires that States with final authorization modify their programs to reflect Federal program changes and subsequently submit the modification to EPA for approval. The deadline by which the State would have to modify its program to adopt these regulations is specified in section 271.21(e). This deadline can be extended in certain cases (see section 271.21(e)(3)). Once EPA approves the modification, the State requirements become Subtitle C RCRA requirements.

States with authorized RCRA programs may already have requirements similar to those in today's rule. These State regulations have not been assessed against the Federal regulations being promulgated today to determine whether they meet the tests for authorization. Thus, a State is not authorized to implement these requirements in lieu of EPA until the State program modifications are approved. Of course, States with existing standards could continue to administer and enforce their standards as a matter of State law. In implementing the Federal program, EPA will work with States under agreements to minimize duplication of efforts.

D. Streamlined Authorization Procedures

It is EPA's policy to provide as much flexibility as possible to encourage States to become authorized for rules under the hazardous waste program. EPA discussed an expedited authorization approach in the proposed Phase IV LDR rule (60 FR 43688, August 22, 1995), and the supplemental proposal (61 FR 2338, January 25, 1996). EPA also discussed streamlined authorization procedures in a more comprehensive fashion in the proposed HWIR-media rule (61 FR 18780, April 29, 1996). This expedited approach would apply to those minor or routine changes to the existing program that do not expand the scope of the program in significant ways, and was called Category 1. EPA has decided to address this proposed authorization procedure in the upcoming HWIR-Media rule rather than here, so that the expedited authorization approaches can be dealt with in a comprehensive manner.

XV. Submission to Congress and General Accounting Office

The Congressional Review Act, 5 U.S.C. § 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. This rule is not a ''major rule'' as defined by 5 U.S.C. § 804(2).

XVI. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045: The Executive Order 13045 applies to any rule that EPA determines (1) ''economically significant'' as defined under Executive Order 12866, and (2) the environmental health or safety risk addressed by the rule has a disproportionate effect on children. If the regulatory action meets both criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to E.O. 13045, entitled ''Protection of Children from Environmental Health Risks and Safety Risks (62FR19885, April 23, 1997), because this is not an economically significant regulatory action as defined by E.O. 12866.

XVII. National Technology Transfer and Advancement Act

Under § 12(d) of the National Technology Transfer and Advancement Act, the Agency is directed to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, business practices, etc.) that are developed or adopted by voluntary consensus standard bodies. Where available and potentially applicable voluntary consensus standards are not used by EPA, the Act requires the Agency to provide Congress, through the Office of Management and Budget, an explanation of the reasons for not using such standards.

EPA is not proposing any new test methods or other technical standards as part of today's final rule. Thus, the Agency has no need to consider the use of voluntary consensus standards in developing this proposed rule.

List of Subjects

40 CFR Part 148

Administrative practice and procedure, Hazardous waste, Reporting and recordkeeping requirements, Water supply.

40 CFR Part 261

Environmental protection, Hazardous waste, Recycling, Reporting and recordkeeping requirements.

40 CFR Part 266

Energy, Hazardous waste, Recycling, Reporting and recordkeeping requirements.

40 CFR Part 268

Hazardous waste, Reporting and recordkeeping requirements.

40 CFR Part 271

Administrative practice and procedure, Hazardous materials transportation, Hazardous waste, Penalties, Reporting and recordkeeping requirements.

Dated: April 30, 1998.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, Title 40, chapter I of the Code of Federal Regulations is amended as follows:

PART 148—HAZARDOUS WASTE INJECTION RESTRICTIONS

1. The authority citation for Part 148 continues to read as follows:

Authority: Secs. 3004, Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*

2. Section 148.18 is amended by redesignating paragraphs (a) through (f) as (c) through (h) respectively, and by adding paragraphs (a) and (b) to read as follows:

§ 148.18 Waste specific prohibitions—newly listed and identified wastes.

(a) Effective August 24, 1998, all newly identified D004–D011 wastes and characteristic mineral processing wastes, except those identified in paragraph (b) of this section, are prohibited from underground injection.

(b) Effective May 26, 2000, characteristic hazardous wastes from titanium dioxide mineral processing, and radioactive wastes mixed with newly identified D004–D011 or mixed with newly identified characteristic mineral processing wastes, are prohibited from underground injection.

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PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

Subpart A—General

3. The authority citation for Part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y), and 6938.

4. Section 261.2 is amended by revising Table 1 in paragraph (c)(4), paragraph (c)(3) and (e)(1)(iii) to read as follows:

§ 261.2 Definition of solid waste.

* * * * *

(c) * * *

(3) *Reclaimed.* Materials noted with a ''*'' in column 3 of Table 1 are solid wastes when reclaimed (except as provided under 40 CFR 261.4(a)(15)). Materials noted with a ''—'' in column 3 of Table 1 are not solid wastes when reclaimed (except as provided under 40 CFR 261.4(a)(15)).

* * * * *

(4) * * *

TABLE 1

	Use constituting disposal (§ 261.2(c)(1))	Energy recovery/ fuel (§ 261.2(c)(2))	Reclamation (§ 261.2(c)(3)) (except as provided in 261.4(a)(15) for mineral processing secondary materials)	Speculative accumulation (§ 261.2(c)(4))
	1	2	3	4
Spent Materials	(*)	(*)	(*)	(*)
Sludges (listed in 40 CFR Part 261.31 or 261.32	(*)	(*)	(*)	(*)
Sludges exhibiting a characteristic of hazardous waste	(*)	(*)	—	(*)
By-products (listed in 40 CFR 261.31 or 261.32)	(*)	(*)	(*)	(*)
By-products exhibiting a characteristic of hazardous waste	(*)	(*)	—	(*)
Commercial chemical products listed in 40 CFR 261.33	(*)	(*)	—	—
Scrap metal other than excluded scrap metal (see 261.1(c)(9))	(*)	(*)	(*)	(*)

Note: The terms ''spent materials,'' ''sludges,'' ''by-products,'' and ''scrap metal'' and ''processed scrap metal'' are defined in § 261.1.

* * * * *

(e) * * *

(1) * * *

(iii) In cases where the materials are generated and reclaimed within the primary mineral processing industry, the conditions of the exclusion found at § 261.4(a)(15) apply rather than this provision.

* * * * *

5. Section 261.3 is amended by revising paragraphs (a)(2)(i) and (a)(2)(iii) to read as follows:

§ 261.3 Definition of hazardous waste.

(a) * * *

(2) * * *

(i) It exhibits any of the characteristics of hazardous waste identified in subpart C of this part. However, any mixture of a waste from the extraction, beneficiation, and processing of ores and minerals excluded under § 261.4(b)(7) and any other solid waste exhibiting a characteristic of hazardous waste under subpart C is a hazardous waste only if it exhibits a characteristic that would not have been exhibited by the excluded waste alone if such mixture had not occurred, or if it continues to exhibit any of the characteristics exhibited by the non-excluded wastes prior to mixture. Further, for the purposes of applying the Toxicity Characteristic to such mixtures, the mixture is also a hazardous waste if it exceeds the maximum concentration for any contaminant listed in table I to § 261.24 that would not have been exceeded by the excluded waste alone if the mixture had not occurred or if it continues to exceed the maximum concentration for any contaminant exceeded by the nonexempt waste prior to mixture.

* * * * *

(iii) It is a mixture of a solid waste and a hazardous waste that is listed in subpart D of this part solely because it exhibits one or more of the characteristics of hazardous waste identified in subpart C of this part, unless the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subpart C of this part, or unless the solid waste is excluded from regulation under § 261.4(b)(7) and the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subpart C of this part for which the hazardous waste listed in subpart D of this part was listed. (However, nonwastewater mixtures are still subject to the requirements of part 268 of this chapter, even if they no longer exhibit a characteristic at the point of land disposal).

* * * * *

6. Section 261.4 is amended by adding paragraphs (a)(9)(iii) and (a)(16) and by revising paragraph (b)(7) to read as follows:

§ 261.4 Exclusions.

(a) * * *

(9) * * *

(iii) Prior to reuse, the wood preserving wastewaters and spent wood preserving solutions described in paragraphs (a)(9)(i) and (a)(9)(ii) of this section, so long as they meet all of the following conditions:

(A) The wood preserving wastewaters and spent wood preserving solutions are reused on-site at water borne plants in the production process for their original intended purpose;

(B) Prior to reuse, the wastewaters and spent wood preserving solutions are managed to prevent release to either land or groundwater or both;

(C) Any unit used to manage wastewaters and/or spent wood preserving solutions prior to reuse can be visually or otherwise determined to prevent such releases;

(D) Any drip pad used to manage the wastewaters and/or spent wood preserving solutions prior to reuse complies with the standards in part 265, subpart W of this chapter, regardless of whether the plant generates a total of less than 100 kg/month of hazardous waste; and

(E) Prior to operating pursuant to this exclusion, the plant owner or operator submits to the appropriate Regional Administrator or State Director a one-time notification stating that the plant intends to claim the exclusion, giving the date on which the plant intends to begin operating under the exclusion, and containing the following language: ''I have read the applicable regulation establishing an exclusion for wood preserving wastewaters and spent wood preserving solutions and understand it requires me to comply at all times with the conditions set out in the regulation.'' The plant must maintain a copy of that document in its on-site records for a period of no less than 3 years from the date specified in the notice. The exclusion applies only so long as the plant meets all of the conditions. If the plant goes out of compliance with any condition, it may apply to the appropriate Regional Administrator or State Director for reinstatement. The Regional Administrator or State Director may reinstate the exclusion upon finding that the plant has returned to compliance with all conditions and that violations are not likely to recur.

* * * * *

(16) Secondary materials (i.e., sludges, by-products, and spent materials as defined in § 261.1) (other than

hazardous wastes listed in subpart D of this part) generated within the primary mineral processing industry from which minerals, acids, cyanide, water or other values are recovered by mineral processing, provided that:

(i) The secondary material is legitimately recycled to recover minerals, acids, cyanide, water or other values;

(ii) The secondary material is not accumulated speculatively;

(iii) Except as provided in paragraph (a)(15)(iv) of this section, the secondary material is stored in tanks, containers, or buildings meeting the following minimum integrity standards: a building must be an engineered structure with a floor, walls, and a roof all of which are made of non-earthen materials providing structural support (except smelter buildings may have partially earthen floors provided the secondary material is stored on the non-earthen portion), and have a roof suitable for diverting rainwater away from the foundation; a tank must be free standing, not be a surface impoundment (as defined in 40 CFR 260.10), and be manufactured of a material suitable for containment of its contents; a container must be free standing and be manufactured of a material suitable for containment of its contents. If tanks or containers contain any particulate which may be subject to wind dispersal, the owner/operator must operate these units in a manner which controls fugitive dust. Tanks, containers, and buildings must be designed, constructed and operated to prevent significant releases to the environment of these materials.

(iv) The Regional Administrator or the State Director may make a site-specific determination, after public review and comment, that only solid mineral processing secondary materials may be placed on pads, rather than in tanks, containers, or buildings. Solid mineral processing secondary materials do not contain any free liquid. The decision-maker must affirm that pads are designed, constructed and operated to prevent significant releases of the secondary material into the environment. Pads must provide the same degree of containment afforded by the non-RCRA tanks, containers and buildings eligible for exclusion.

(A) The decision-maker must also consider if storage on pads poses the potential for significant releases via groundwater, surface water, and air exposure pathways. Factors to be considered for assessing the groundwater, surface water, air exposure pathways are: the volume and physical and chemical properties of the secondary material, including its potential for migration off the pad; the potential for human or environmental exposure to hazardous constituents migrating from the pad via each exposure pathway, and the possibility and extent of harm to human and environmental receptors via each exposure pathway.

(B) Pads must meet the following minimum standards: be designed of non-earthen material that is compatible with the chemical nature of the mineral processing secondary material, capable of withstanding physical stresses associated with placement and removal, have run on/runoff controls, be operated in a manner which controls fugitive dust, and have integrity assurance through inspections and maintenance programs.

(C) Before making a determination under this paragraph, the Regional Administrator or State Director must provide notice and the opportunity for comment to all persons potentially interested in the determination. This can be accomplished by placing notice of this action in major local newspapers, or broadcasting notice over local radio stations.

(v) The owner or operator provides a notice to the Regional Administrator or State Director, identifying the following information: the types of materials to be recycled; the type and location of the storage units and recycling processes; and the annual quantities expected to be placed in land-based units. This notification must be updated when there is a change in the type of materials recycled or the location of the recycling process.

(vi) For purposes of § 261.4(b)(7), mineral processing secondary materials must be the result of mineral processing and may not include any listed hazardous wastes. Listed hazardous wastes and characteristic hazardous wastes generated by non-mineral processing industries are not eligible for the conditional exclusion from the definition of solid waste.

(b) * * *

(7) Solid waste from the extraction, beneficiation, and processing of ores and minerals (including coal, phosphate rock, and overburden from the mining of uranium ore), except as provided by § 266.112 of this chapter for facilities that burn or process hazardous waste.

(i) For purposes of § 261.4(b)(7) beneficiation of ores and minerals is restricted to the following activities; crushing; grinding; washing; dissolution; crystallization; filtration; sorting; sizing; drying; sintering; pelletizing; briquetting; calcining to remove water and/or carbon dioxide; roasting, autoclaving, and/or chlorination in preparation for leaching (except where the roasting (and/or autoclaving and/or chlorination)/leaching sequence produces a final or intermediate product that does not undergo further beneficiation or processing); gravity concentration; magnetic separation; electrostatic separation; flotation; ion exchange; solvent extraction; electrowinning; precipitation; amalgamation; and heap, dump, vat, tank, and in situ leaching.

(ii) For the purposes of § 261.4(b)(7), solid waste from the processing of ores and minerals includes only the following wastes as generated:

(A) Slag from primary copper processing;

(B) Slag from primary lead processing;

(C) Red and brown muds from bauxite refining;

(D) Phosphogypsum from phosphoric acid production;

(E) Slag from elemental phosphorus production;

(F) Gasifier ash from coal gasification;

(G) Process wastewater from coal gasification;

(H) Calcium sulfate wastewater treatment plant sludge from primary copper processing;

(I) Slag tailings from primary copper processing;

(J) Fluorogypsum from hydrofluoric acid production;

(K) Process wastewater from hydrofluoric acid production;

(L) Air pollution control dust/sludge from iron blast furnaces;

(M) Iron blast furnace slag;

(N) Treated residue from roasting/leaching of chrome ore;

(O) Process wastewater from primary magnesium processing by the anhydrous process;

(P) Process wastewater from phosphoric acid production;

(Q) Basic oxygen furnace and open hearth furnace air pollution control dust/sludge from carbon steel production;

(R) Basic oxygen furnace and open hearth furnace slag from carbon steel production;

(S) Chloride process waste solids from titanium tetrachloride production;

(T) Slag from primary zinc processing.

(iii) A residue derived from co-processing mineral processing secondary materials with normal beneficiation raw materials remains excluded under paragraph (b) of this section if the owner or operator:

(A) Processes at least 50 percent by weight normal beneficiation raw materials; and,

(B) Legitimately reclaims the secondary mineral processing materials.

* * * * *

PART 268—LAND DISPOSAL RESTRICTIONS

7. The authority citation for Part 268 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, and 6924.

8. Section 268.2 is amended by revising paragraph (i) and adding paragraph (k) to read as follows:

§ 268.2 Definitions applicable in this part.

* * * * *

(i) Underlying hazardous constituent means any constituent listed in § 268.48, Table UTS—Universal Treatment Standards, except fluoride, selenium, sulfides, vanadium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards.

* * * * *

(k) Soil means unconsolidated earth material composing the superficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles as classified by the U.S. Soil Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume based on visual inspection.

9. Section 268.3 is amended by adding paragraph (d) to read as follows:

§ 268.3 Dilution prohibited as a substitute for treatment.

* * * * *

(d) It is a form of impermissible dilution, and therefore prohibited, to add iron filings or other metallic forms of iron to lead-containing hazardous wastes in order to achieve any land disposal restriction treatment standard for lead. Lead-containing wastes include D008 wastes (wastes exhibiting a characteristic due to the presence of lead), all characteristic wastes containing lead as an underlying hazardous constituent, listed wastes containing lead as a regulated constitutent, and hazardous media containing any of the aforementioned lead-containing wastes.

10. Section 268.4 is amended by revising paragraphs (a)(2)(ii) and (a)(2)(iii) to read as follows:

§ 268.4 Treatment surface impoundment exemption.

(a) * * *

(2) * * *

(ii) Removal. The following treatment residues (including any liquid waste) must be removed at least annually; residues which do not meet the treatment standards promulgated under subpart D of this part; residues which do not meet the prohibition levels established under subpart C of this part or imposed by statute (where no treatment standards have been established); residues which are from the treatment of wastes prohibited from land disposal under subpart C of this part (where no treatment standards have been established and no prohibition levels apply); or residues from managing listed wastes which are not delisted under § 260.22 of this chapter. If the volume of liquid flowing through the impoundment or series of impoundments annually is greater than the volume of the impoundment or impoundments, this flow-through constitutes removal of the supernatant for the purpose of this requirement.

(iii) Subsequent management. Treatment residues may not be placed in any other surface impoundment for subsequent management.

* * * * *

11. Section 268.7 is amended by revising paragraphs (a)(1), (a)(3)(ii), (a)(7), (b)(1), (b)(2), (b)(5) and (b)(6); by revising the first sentence of the paragraphs (a)(2), (a)(3) introductory text, (a)(4), (a)(5) introductory text, (a)(6), and (b)(3) introductory text; by adding paragraph (a)(2)(i) and three sentences to the end of paragraph (b)(4) introductory text and adding paragraphs (b)(4)(iv), (b)(4)(v), and (e) and adding and reserving paragraph (a)(2)(ii); and by revising entries 1 and 3, designating entry 8 as 9, and adding entry 8 in the table entitled ‘‘Generator Paperwork Requirements Table’’ in paragraph (a)(4), and by revising entries 1 and 2 designating entry 5 as 6, and adding entry 5 in the table entitled ‘‘Treatment Facility Paperwork Requirements Table’’ in paragraph (b)(3)(ii) to read as follows:

§ 268.7 Testing, tracking, and recordkeeping requirements for generators, treaters, and disposal facilities.

(a) * * *

(1) A generator of hazardous waste must determine if the waste has to be treated before it can be land disposed. This is done by determining if the hazardous waste meets the treatment standards in § 268.40, § 268.45, or § 268.49. This determination can be made in either of two ways: testing the waste or using knowledge of the waste. If the generator tests the waste, testing would normally determine the total concentration of hazardous constituents, or the concentration of hazardous constituents in an extract of the waste obtained using test method 1311 in ‘‘Test Methods of Evaluating Solid Waste, Physical/Chemical Methods,’’ EPA Publication SW–846, as referenced in § 260.11 of this chapter, depending on whether the treatment standard for the waste is expressed as a total concentration or concentration of hazardous constituent in the waste’s extract. In addition, some hazardous wastes must be treated by particular treatment methods before they can be land disposed and some soils are contaminated by such hazardous wastes. These treatment standards are also found in § 268.40, and are described in detail in § 268.42, Table 1. These wastes, and soils contaminated with such wastes, do not need to be tested (however, if they are in a waste mixture, other wastes with concentration level treatment standards would have to be tested). If a generator determines they are managing a waste or soil contaminated with a waste, that displays a hazardous characteristic of ignitability, corrosivity, reactivity, or toxicity, they must comply with the special requirements of § 268.9 of this part in addition to any applicable requirements in this section.

(2) If the waste or contaminated soil does not meet the treatment standard: With the initial shipment of waste to each treatment or storage facility, the generator must send a one-time written notice to each treatment or storage facility receiving the waste, and place a copy in the file. * * *

(i) For contaminated soil, the following certification statement should be included, signed by an authorized representative:

I certify under penalty of law that I personally have examined this contaminated soil and it [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and requires treatment to meet the soil treatment standards as provided by 268.49(c).

(ii) [Reserved]

(3) If the waste or contaminated soil meets the treatment standard at the original point of generation:

* * * * *

(ii) For contaminated soil, with the initial shipment of wastes to each treatment, storage, or disposal facility, the generator must send a one-time written notice to each facility receiving the waste and place a copy in the file. The notice must include the information in ‘‘268.7(a)(3) of the Generator Paperwork Requirements Table in § 268.7(a)(4).

(4) For reporting, tracking, and recordkeeping when exceptions allow certain wastes or contaminated soil that

do not meet the treatment standards to be land disposed: There are certain exemptions from the requirement that hazardous wastes or contaminated soil meet treatment standards before they can be land disposed. * * *

* * * * *

GENERATOR PAPERWORK REQUIREMENTS TABLE

Required information	§ 268.7 (a)(2)	§ 268.7 (a)(3)	§ 268.7 (a)(4)	§ 268.7 (a)(9)
1. EPA Hazardous Waste Numbers and Manifest Number of first shipment.				
* * * * * * *				
3. The waste is subject to the LDRs. The constituents of concern for F001–F005, and F039, and underlying hazardous constituents in characteristic wastes, unless the waste will be treated and monitored for all constituents. If all constituents will be treated and monitored, there is no need to put them all on the LDR notice	✔	....	....	....
* * * * * * *				
8. For contaminated soil subject to LDRs as provided in 268.49(a), the constituents subject to treatment as described in 268.49(d), and the following statement: This contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and [is subject to/complies with' the soil treatment standards as provided by 268.49(c) or the universal treatment standards.	✔	....	....	....
* * * * * * *				

(5) If a generator is managing and treating prohibited waste or contaminated soil in tanks, containers, or containment buildings regulated under 40 CFR 262.34 to meet applicable LDR treatment standards found at § 268.40, the generator must develop and follow a written waste analysis plan which describes the procedures they will carry out to comply with the treatment standards. * * *

* * * * *

(6) If a generator determines that the waste or contaminated soil is restricted based solely on his knowledge of the waste, all supporting data used to make this determination must be retained on-site in the generator's files. * * *

(7) If a generator determines that he is managing a prohibited waste that is excluded from the definition of hazardous or solid waste or is exempted from Subtitle C regulation under 40 CFR 261.2 through 261.6 subsequent to the point of generation (including deactivated characteristic hazardous wastes managed in wastewater treatment systems subject to the Clean Water Act (CWA) as specified at 40 CFR 261.4(a)(2) or that are CWA-equivalent, or are managed in an underground injection well regulated by the SDWA), he must place a one-time notice describing such generation, subsequent exclusion from the definition of hazardous or solid waste or exemption from RCRA Subtitle C regulation, and the disposition of the waste, in the facility's on-site files.

* * * * *

(b) * * *

(1) For wastes or contaminated soil with treatment standards expressed in the waste extract (TCLP), the owner or operator of the treatment facility must test an extract of the treatment residues, using test method 1311 (the Toxicity Characteristic Leaching Procedure, described in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication SW–846 as incorporated by reference in § 260.11 of this chapter) to assure that the treatment residues extract meet the applicable treatment standards.

(2) For wastes or contaminated soil with treatment standards expressed as concentrations in the waste, the owner or operator of the treatment facility must test the treatment residues (not an extract of such residues) to assure that they meet the applicable treatment standards.

(3) A one-time notice must be sent with the initial shipment of waste or contaminated soil to the land disposal facility. * * *

* * * * *

(ii) * * *

TREATMENT FACILITY PAPERWORK REQUIREMENTS TABLE

Required information	§ 268.7(b)
1. EPA Hazardous Waste Numbers and Manifest Number of first shipment.	
2. The waste is subject to the LDRs. The constituents of concern for F001–F005, and F039, and underlying hazardous constituents in characteristic wastes, unless the waste will be treated and monitored for all constituents. If all constituents will be treated and monitored, there is no need to put them all on the LDR notice.	✔
* * * * * * *	
5. For contaminated soil subject to LDRs as provided in 268.49(a), the constituents subject to treatment as described in 268.49(d) and the following statement, ''this contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit acharacteristic of hazardous waste and [is subject to/complies with] the soil treatment standards as provided by 268.49(c).	✔
* * * * * * *	

(4) * * * A certification is also necessary for contaminated soil and it must state:

> I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to

> comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

* * * * *

(iv) For characteristic wastes that are subject to the treatment standards in § 268.40 (other than those expressed as a required method of treatment) that are reasonably expected to contain underlying hazardous constituents as defined in § 268.2(i); are treated on-site to remove the hazardous characteristic; and are then sent off-site for treatment of underlying hazardous constituents, the certification must state the following:

> I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet universal treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

(v) For characteristic wastes that contain underlying hazardous constituents as defined § 268.2(i) that are treated on-site to remove the hazardous characteristic to treat underlying hazardous constituents to levels in § 268.48 Universal Treatment Standards, the certification must state the following:

> I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic and that underlying hazardous constituents, as defined in § 268.2(i) have been treated on-site to meet the § 268.48 Universal Treatment Standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

(5) If the waste or treatment residue will be further managed at a different treatment, storage, or disposal facility, the treatment, storage, or disposal facility sending the waste or treatment residue off-site must comply with the notice and certification requirements applicable to generators under this section.

(6) Where the wastes are recyclable materials used in a manner constituting disposal subject to the provisions of § 268.20(b) regarding treatment standards and prohibition levels, the owner or operator of a treatment facility (i.e., the recycler) is not required to notify the receiving facility, pursuant to paragraph (b)(3) of this section. With each shipment of such wastes the owner or operator of the recycling facility must submit a certification described in paragraph (b)(4) of this section, and a notice which includes the information listed in paragraph (b)(3) of this section (except the manifest number) to the Regional Administrator, or his delegated representative. The recycling facility also must keep records of the name and location of each entity receiving the hazardous waste-derived product.

* * * * *

(e) Generators and treaters who first receive from EPA or an authorized state a determination that a given contaminated soil subject to LDRs as provided in § 268.49(a) no longer contains a listed hazardous waste and generators and treaters who first determine that a contaminated soil subject to LDRs as provided in § 268.49(a) no longer exhibits a characteristic of hazardous waste must:

(1) Prepare a one-time only documentation of these determinations including all supporting information; and,

(2) Maintain that information in the facility files and other records for a minimum of three years.

Subpart C—Prohibitions on Land Disposal

12. Section § 268.34 is revised to read as follows:

§ 268.34 Waste specific prohibitions—toxicity characteristic metal wastes.

(a) Effective August 24, 1998, the following wastes are prohibited from land disposal: the wastes specified in 40 CFR Part 261 as EPA Hazardous Waste numbers D004—D011 that are newly identified (i.e. wastes, soil, or debris identified as hazardous by the Toxic Characteristic Leaching Procedure but not the Extraction Procedure), and waste, soil, or debris from mineral processing operations that is identified as hazardous by the specifications at 40 CFR Part 261.

(b) Effective May 26, 2000, the following wastes are prohibited from land disposal: newly identified characteristic wastes from elemental phosphorus processing; radioactive wastes mixed with EPA Hazardous wastes D004—D011 that are newly identified (i.e. wastes, soil, or debris identified as hazardous by the Toxic Characteristic Leaching Procedure but not the Extraction Procedure); or mixed with newly identified characteristic mineral processing wastes, soil, or debris.

(c) Between May 26, 1998 and May 26, 2000, newly identified characteristic wastes from elemental phosphorus processing, radioactive waste mixed with D004—D011 wastes that are newly identified (i.e. wastes, soil, or debris identified as hazardous by the Toxic Characteristic Leaching Procedure but not the Extraction Procedure), or mixed with newly identified characteristic mineral processing wastes, soil, or debris may be disposed in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in § 268.5(h)(2) of this part.

(d) The requirements of paragraphs (a) and (b) of this section do not apply if:

(1) The wastes meet the applicable treatment standards specified in subpart D of this part;

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under § 268.6, with respect to those wastes and units covered by the petition;

(3) The wastes meet the applicable alternate treatment standards established pursuant to a petition granted under § 268.44; or

(4) Persons have been granted an extension to the effective date of a prohibition pursuant to § 268.5, with respect to these wastes covered by the extension.

(e) To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards specified in § 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the waste, or the generator may use knowledge of the waste. If the waste contains constituents (including underlying hazardous constituents in characteristic wastes) in excess of the applicable Universal Treatment Standard levels of § 268.48 of this part, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.

Subpart D—Treatment Standards

13. Section 268.40 is amended by revising paragraph (e), adding paragraph (h), and revising the Table of Treatment Standards to read as follows:

§ 268.40 Applicability of treatment standards.

* * * * *

(e) For characteristic wastes (D001—D043) that are subject to treatment standards in the following table ‘‘Treatment Standards for Hazardous Wastes,’’ and are not managed in a wastewater treatment system that is regulated under the Clean Water Act (CWA), that is CWA-equivalent, or that is injected into a Class I nonhazardous deep injection well, all underlying hazardous constituents (as defined in § 268.2(i)) must meet Universal Treatment Standards, found in § 268.48, Table Universal Treatment Standards, prior to land disposal as defined in § 268.2(c) of this part.

* * * * *

(h) Prohibited D004–D011 mixed radioactive wastes and mixed radioactive listed wastes containing metal constituents, that were previously treated by stabilization to the treatment standards in effect at that time and then put into storage, do not have to be re-treated to meet treatment standards in this section prior to land disposal.

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TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D001 [9]	Ignitable Characteristic Wastes, except for the §261.21(a)(1) High TOC Subcategory.	NA	NA	DEACT and meet §268.48 standards[8]; or RORGS; or CMBST	DEACT and meet §268.48 standards[8]; or RORGS; or CMBST
	High TOC Ignitable Characteristic Liquids Subcategory based on 40 CFR 261.21(a)(1) - Greater than or equal to 10% total organic carbon. (Note: This subcategory consists of nonwastewaters only.)	NA	NA	NA	RORGS; CMBST; or POLYM
D002 [9]	Corrosive Characteristic Wastes.	NA	NA	DEACT and meet §268.48 standards[8]	DEACT and meet §268.48 standards[8]
D002, D004, D005, D006, D007, D008, D009, D010, D011	Radioactive high level wastes generated during the reprocessing of fuel rods. (Note: This subcategory consists of nonwastewaters only.)	Corrosivity (pH)	NA	NA	HLVIT
		Arsenic	7440-38-2	NA	HLVIT
		Barium	7440-39-3	NA	HLVIT
		Cadmium	7440-43-9	NA	HLVIT
		Chromium (Total)	7440-47-3	NA	HLVIT
		Lead	7439-92-1	NA	HLVIT
		Mercury	7439-97-6	NA	HLVIT
		Selenium	7782-49-2	NA	HLVIT
		Silver	7440-22-4	NA	HLVIT
D003 [9]	Reactive Sulfides Subcategory based on 261.23(a)(5).	NA	NA	DEACT	DEACT
	Explosives Subcategory based on 261.23(a)(6), (7), and (8).	NA	NA	DEACT and meet §268.48 standards[8]	DEACT and meet §268.48 standards[8]

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	Unexploded ordnance and other explosive devices which have been the subject of an emergency response.	NA	NA	DEACT	DEACT
	Other Reactives Subcategory based on 261.23(a)(1).	NA	NA	DEACT and meet §268.48 standards[8]	DEACT and meet §268.48 standards[8]
	Water Reactive Subcategory based on 261.23(a)(2), (3), and (4). (Note: This subcategory consists of nonwastewaters only.)	NA	NA	NA	DEACT and meet §268.48 standards[8]
	Reactive Cyanides Subcategory based on 261.23(a)(5).	Cyanides (Total)[7]	57-12-5	Reserved	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
D004 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for arsenic based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Arsenic	7440-38-2	1.4 and meet §268.48 standards[8]	5.0 mg/l TCLP and meet §268.48 standards[8]
D005 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for barium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Barium	7440-39-3	1.2 and meet §268.48 standards[8]	21 mg/l TCLP and meet §268.48 standards[8]
D006 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for cadmium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Cadmium	7440-43-9	0.69 and meet §268.48 standards[8]	0.11 mg/l TCLP and meet §268.48 standards[8]
	Cadmium Containing Batteries Subcategory. (Note: This subcategory consists of nonwastewaters only.)	Cadmium	7440-43-9	NA	RTHRM

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D007 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for chromium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Chromium (Total)	7440-47-3	2.77 and meet §268.48 standards[8]	0.60 mg/l TCLP and meet §268.48 standards[8]
D008 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for lead based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Lead	7439-92-1	0.69 and meet §268.48 standards[8]	0.75 mg/l TCLP and meet §268.48 standards[8]
	Lead Acid Batteries Subcategory (Note: This standard only applies to lead acid batteries that are identified as RCRA hazardous wastes and that are not excluded elsewhere from regulation under the land disposal restrictions of 40 CFR 268 or exempted under other EPA regulations (see 40 CFR 266.80). This subcategory consists of nonwastewaters only.)	Lead	7439-92-1	NA	RLEAD
	Radioactive Lead Solids Subcategory (Note: these lead solids include, but are not limited to, all forms of lead shielding and other elemental forms of lead. These lead solids do not include treatment residuals such as hydroxide sludges, other wastewater treatment residuals, or incinerator ashes that can undergo conventional pozzolanic stabilization, nor do they include organo-lead materials that can be incinerated and stabilized as ash. This subcategory consists of nonwastewaters only.)	Lead	7439-92-1	NA	MACRO
D009 [9]	Nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain greater than or equal to 260 mg/kg total mercury that also contain organics and are not incinerator residues. (High Mercury-Organic Subcategory)	Mercury	7439-97-6	NA	IMERC; OR RMERC

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	Nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain greater than or equal to 260 mg/kg total mercury that are inorganic, including incinerator residues and residues from RMERC. (High Mercury-Inorganic Subcategory)	Mercury	7439-97-6	NA	RMERC
	Nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain less than 260 mg/kg total mercury and that are residues from RMERC only. (Low Mercury Subcategory)	Mercury	7439-97-6	NA	0.20 mg/l TCLP and meet §268.48 standards[8]
	All other nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain less than 260 mg/kg total mercury and that are not residues from RMERC. (Low Mercury Subcategory)	Mercury	7439-97-6	NA	0.025 mg/l TCLP and meet §268.48 standards[8]
	All D009 wastewaters.	Mercury	7439-97-6	0.15 and meet §268.48 standards[8]	NA
	Elemental mercury contaminated with radioactive materials. (Note: This subcategory consists of nonwastewaters only.)	Mercury	7439-97-6	NA	AMLGM
	Hydraulic oil contaminated with Mercury Radioactive Materials Subcategory. (Note: This subcategory consists of nonwastewaters only.)	Mercury	7439-97-6	NA	IMERC

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D010 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for selenium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Selenium	7782-49-2	0.82 and meet §268.48 standards[8]	5.7 mg/l TCLP and meet §268.48 standards[8]
D011 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for silver based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Silver	7440-22-4	0.43 and meet §268.48 standards[8]	0.14 mg/l TCLP and meet §268.48 standards[8]
D012 [9]	Wastes that are TC for Endrin based on the TCLP in SW846 Method 1311.	Endrin	72-20-8	BIODG; or CMBST	0.13 and meet §268.48 standards[8]
		Endrin aldehyde	7421-93-4	BIODG; or CMBST	0.13 and meet §268.48 standards[8]
D013 [9]	Wastes that are TC for Lindane based on the TCLP in SW846 Method 1311.	alpha-BHC	319-84-6	CARBN; or CMBST	0.066 and meet §268.48 standards[8]
		beta-BHC	319-85-7	CARBN; or CMBST	0.066 and meet §268.48 standards[8]
		delta-BHC	319-86-8	CARBN; or CMBST	0.066 and meet §268.48 standards[8]
		gamma-BHC (Lindane)	58-89-9	CARBN; or CMBST	0.066 and meet §268.48 standards[8]

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D014 [9]	Wastes that are TC for Methoxychlor based on the TCLP in SW846 Method 1311.	Methoxychlor	72-43-5	WETOX or CMBST	0.18 and meet §268.48 standards[8]
D015 [9]	Wastes that are TC for Toxaphene based on the TCLP in SW846 Method 1311.	Toxaphene	8001-35-2	BIODG or CMBST	2.6 and meet §268.48 standards[8]
D016 [9]	Wastes that are TC for 2,4-D (2,4-Dichlorophenoxyacetic acid) based on the TCLP in SW846 Method 1311.	2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	CHOXD, BIODG, or CMBST	10 and meet §268.48 standards[8]
D017 [9]	Wastes that are TC for 2,4,5-TP (Silvex) based on the TCLP in SW846 Method 1311.	2,4,5-TP (Silvex)	93-72-1	CHOXD or CMBST	7.9 and meet §268.48 standards[8]
D018 [9]	Wastes that are TC for Benzene based on the TCLP in SW846 Method 1311.	Benzene	71-43-2	0.14 and meet §268.48 standards[8]	10 and meet §268.48 standards[8]
D019 [9]	Wastes that are TC for Carbon tetrachloride based on the TCLP in SW846 Method 1311.	Carbon tetrachloride	56-23-5	0.057 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D020 [9]	Wastes that are TC for Chlordane based on the TCLP in SW846 Method 1311.	Chlordane (alpha and gamma isomers)	57-74-9	0.0033 and meet §268.48 standards[8]	0.26 and meet §268.48 standards[8]
D021 [9]	Wastes that are TC for Chlorobenzene based on the TCLP in SW846 Method 1311.	Chlorobenzene	108-90-7	0.057 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D022 [9]	Wastes that are TC for Chloroform based on the TCLP in SW846 Method 1311.	Chloroform	67-66-3	0.046 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D023 [9]	Wastes that are TC for o-Cresol based on the TCLP in SW846 Method 1311.	o-Cresol	95-48-7	0.11 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D024 [9]	Wastes that are TC for m-Cresol based on the TCLP in SW846 Method 1311.	m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D025 [9]	Wastes that are TC for p-Cresol based on the TCLP in SW846 Method 1311.	p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D026 [9]	Wastes that are TC for Cresols (Total) based on the TCLP in SW846 Method 1311.	Cresol-mixed isomers (Cresylic acid)(sum of o-, m-, and p-cresol concentrations)	1319-77-3	0.88 and meet §268.48 standards[8]	11.2 and meet §268.48 standards[8]
D027 [9]	Wastes that are TC for p-Dichlorobenzene based on the TCLP in SW846 Method 1311.	p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	0.090 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D028 [9]	Wastes that are TC for 1,2-Dichloroethane based on the TCLP in SW846 Method 1311.	1,2-Dichloroethane	107-06-2	0.21 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D029 [9]	Wastes that are TC for 1,1-Dichloroethylene based on the TCLP in SW846 Method 1311.	1,1-Dichloroethylene	75-35-4	0.025 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D030 [9]	Wastes that are TC for 2,4-Dinitrotoluene based on the TCLP in SW846 Method 1311.	2,4-Dinitrotoluene	121-14-2	0.32 and meet §268.48 standards[8]	140 and meet §268.48 standards[8]
D031 [9]	Wastes that are TC for Heptachlor based on the TCLP in SW846 Method 1311.	Heptachlor	76-44-8	0.0012 and meet §268.48 standards[8]	0.066 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Heptachlor epoxide	1024-57-3	0.016 and meet §268.48 standards[8]	0.066 and meet §268.48 standards[8]
D032 [9]	Wastes that are TC for Hexachlorobenzene based on the TCLP in SW846 Method 1311.	Hexachlorobenzene	118-74-1	0.055 and meet §268.48 standards[8]	10 and meet §268.48 standards[8]
D033 [9]	Wastes that are TC for Hexachlorobutadiene based on the TCLP in SW846 Method 1311.	Hexachlorobutadiene	87-68-3	0.055 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D034 [9]	Wastes that are TC for Hexachloroethane based on the TCLP in SW846 Method 1311.	Hexachloroethane	67-72-1	0.055 and meet §268.48 standards[8]	30 and meet §268.48 standards[8]
D035 [9]	Wastes that are TC for Methyl ethyl ketone based on the TCLP in SW846 Method 1311.	Methyl ethyl ketone	78-93-3	0.28 and meet §268.48 standards[8]	36 and meet §268.48 standards[8]
D036 [9]	Wastes that are TC for Nitrobenzene based on the TCLP in SW846 Method 1311.	Nitrobenzene	98-95-3	0.068 and meet §268.48 standards[8]	14 and meet §268.48 standards[8]
D037 [9]	Wastes that are TC for Pentachlorophenol based on the TCLP in SW846 Method 1311.	Pentachlorophenol	87-86-5	0.089 and meet §268.48 standards[8]	7.4 and meet §268.48 standards[8]
D038 [9]	Wastes that are TC for Pyridine based on the TCLP in SW846 Method 1311.	Pyridine	110-86-1	0.014 and meet §268.48 standards[8]	16 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D039 [9]	Wastes that are TC for Tetrachloroethylene based on the TCLP in SW846 Method 1311.	Tetrachloroethylene	127-18-4	0.056 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D040 [9]	Wastes that are TC for Trichloroethylene based on the TCLP in SW846 Method 1311.	Trichloroethylene	79-01-6	0.054 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D041 [9]	Wastes that are TC for 2,4,5-Trichlorophenol based on the TCLP in SW846 Method 1311.	2,4,5-Trichlorophenol	95-95-4	0.18 and meet §268.48 standards[8]	7.4 and meet §268.48 standards[8]
D042 [9]	Wastes that are TC for 2,4,6-Trichlorophenol based on the TCLP in SW846 Method 1311.	2,4,6-Trichlorophenol	88-06-2	0.035 and meet §268.48 standards[8]	7.4 and meet §268.48 standards[8]
D043 [9]	Wastes that are TC for Vinyl chloride based on the TCLP in SW846 Method 1311.	Vinyl chloride	75-01-4	0.27 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F001, F002, F003, F004, & F005	F001, F002, F003, F004 and/or F005 solvent wastes that contain any combination of one or more of the following spent solvents: acetone, benzene, n-butyl alcohol, carbon disulfide, carbon tetrachloride, chlorinated fluorocarbons, chlorobenzene, o-cresol, m-cresol, p-cresol, cyclohexanone, o-dichlorobenzene, 2-ethoxyethanol, ethyl acetate, ethyl benzene, ethyl ether, isobutyl alcohol, methanol, methylene chloride, methyl ethyl ketone, methyl isobutyl ketone, nitrobenzene, 2-nitropropane, pyridine, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene, trichloromonofluoromethane, and/or xylenes [except as specifically noted in other subcategories]. See further details of these listings in § 261.31	Acetone	67-64-1	0.28	160
		Benzene	71-43-2	0.14	10
		n-Butyl alcohol	71-36-3	5.6	2.6
		Carbon disulfide	75-15-0	3.8	NA
		Carbon tetrachloride	56-23-5	0.057	6.0
		Chlorobenzene	108-90-7	0.057	6.0
		o-Cresol	95-48-7	0.11	5.6
		m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
		p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
		Cresol-mixed isomers (Cresylic acid) (sum of o-, m-, and p-cresol concentrations)	1319-77-3	0.88	11.2
		Cyclohexanone	108-94-1	0.36	NA
		o-Dichlorobenzene	95-50-1	0.088	6.0
		Ethyl acetate	141-78-6	0.34	33
		Ethyl benzene	100-41-4	0.057	10
		Ethyl ether	60-29-7	0.12	160
		Isobutyl alcohol	78-83-1	5.6	170
		Methanol	67-56-1	5.6	NA

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Methylene chloride	75-9-2	0.089	30
		Methyl ethyl ketone	78-93-3	0.28	36
		Methyl isobutyl ketone	108-10-1	0.14	33
		Nitrobenzene	98-95-3	0.068	14
		Pyridine	110-86-1	0.014	16
		Tetrachloroethylene	127-18-4	0.056	6.0
		Toluene	108-88-3	0.080	10
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.057	30
		Trichloroethylene	79-01-6	0.054	6.0
		Trichloromonofluoromethane	75-69-4	0.020	30
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
	F003 and/or F005 solvent wastes that contain any combination of one or more of the following three solvents as the only listed F001-5 solvents: carbon disulfide, cyclohexanone, and/or methanol. (formerly 268.41(c))	Carbon disulfide	75-15-0	3.8	4.8 mg/l TCLP
		Cyclohexanone	108-94-1	0.36	0.75 mg/l TCLP
		Methanol	67-56-1	5.6	0.75 mg/l TCLP
	F005 solvent waste containing 2-Nitropropane as the only listed F001-5 solvent.	2-Nitropropane	79-46-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
	F005 solvent waste containing 2-Ethoxyethanol as the only listed F001-5 solvent.	2-Ethoxyethanol	110-80-5	BIODG: or CMBST	CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F007	Spent cyanide plating bath solutions from electroplating operations.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	NA
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F012	Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
F020, F021, F022, F023, F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of: (1) tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives, excluding wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol (F020); (2) pentachlorophenol, or of intermediates used to produce its derivatives (i.e., F021); (3) tetra-, penta-, or hexachlorobenzenes under alkaline conditions (i.e., F022); and from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of: (1) tri- or tetrachlorophenols, excluding wastes from equipment used only for the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol (F023); (2) tetra-, penta-, or hexachlorobenzenes under alkaline conditions (i.e., F026).	HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
		Pentachlorophenol	87-86-5	0.089	7.4
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
		2,4,5-Trichlorophenol	95-95-4	0.18	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
		2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in §261.31 or §261.32.).	All F024 wastes	NA	CMBST[11]	CMBST[11]
		2-Chloro-1,3-butadiene	126-99-8	0.057	0.28
		3-Chloropropylene	107-05-1	0.036	30
		1,1-Dichloroethane	75-34-3	0.059	6.0
		1,2-Dichloroethane	107-06-2	0.21	6.0
		1,2-Dichloropropane	78-87-5	0.85	18
		cis-1,3-Dichloropropylene	10061-01-5	0.036	18
		trans-1,3-Dichloropropylene	10061-02-6	0.036	18
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Hexachloroethane	67-72-1	0.055	30
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
F025	Condensed light ends from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. F025 - Light Ends Subcategory	Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		1,2-Dichloroethane	107-06-2	0.21	6.0
		1,1-Dichloroethylene	75-35-4	0.025	6.0
		Methylene chloride	75-9-2	0.089	30
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		Trichloroethylene	79-01-6	0.054	6.0
		Vinyl chloride	75-01-4	0.27	6.0

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	Spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. F025 - Spent Filters/Aids and Desiccants Subcategory	Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Hexachlorobenzene	118-74-1	0.055	10
		Hexachlorobutadiene	87-68-3	0.055	5.6
		Hexachloroethane	67-72-1	0.055	30
		Methylene chloride	75-9-2	0.089	30
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		Trichloroethylene	79-01-6	0.054	6.0
		Vinyl chloride	75-01-4	0.27	6.0
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.).	HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
		Pentachlorophenol	87-86-5	0.089	7.4
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		2,4,5-Trichlorophenol	95-95-4	0.18	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
		2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Wastes Nos. F020, F021, F023, F026, and F027.	HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
		Pentachlorophenol	87-86-5	0.089	7.4
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
		2,4,5-Trichlorophenol	95-95-4	0.18	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
		2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or penta-chlorophenol.	Acenaphthene	83-32-9	0.059	3.4
		Anthracene	120-12-7	0.059	3.4
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		2-4-Dimethyl phenol	105-67-9	0.036	14
		Fluorene	86-73-7	0.059	3.4
		Hexachlorodibenzo-p-dioxins	NA	0.000063, or CMBST[11]	0.001, or CMBST[11]
		Hexachlorodibenzofurans	NA	0.000063, or CMBST[11]	0.001, or CMBST[11]
		Indeno (1,2,3-c,d) pyrene	193-39-5	0.0055	3.4
		Naphthalene	91-20-3	0.059	5.6
		Pentachlorodibenzo-p-dioxins	NA	0.000063, or CMBST[11]	0.001, or CMBST[11]

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Pentachlorodibenzofurans	NA	0.000035, or CMBST[11]	0.001, or CMBST[11]
		Pentachlorophenol	87-86-5	0.089	7.4
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyrene	129-00-0	0.067	8.2
		Tetrachlorodibenzo-p-dioxins	NA	0.000063, or CMBST[11]	0.001, or CMBST[11]
		Tetrachlorodibenzofurans	NA	0.000063, or CMBST[11]	0.001, or CMBST[11]
		2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	Acenaphthene	83-32-9	0.059	3.4
		Anthracene	120-12-7	0.059	3.4
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Benzo(a)pyrene	50-32-8	0.061	3.4

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Fluorene	86-73-7	0.059	3.4
		Indeno (1,2,3-c,d) pyrene	193-39-5	0.0055	3.4
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Pyrene	129-00-0	0.067	8.2
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F037	Petroleum refinery primary oil/water/solids separation sludge-Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in: oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing.	Acenaphthene	83-32-9	0.059	NA
		Anthracene	120-12-7	0.059	3.4
		Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Chrysene	218-01-9	0.059	3.4
		Di-n-butyl phthalate	84-74-2	0.057	28
		Ethylbenzene	100-41-4	0.057	10
		Fluorene	86-73-7	0.059	NA
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-3	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air floatation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological units) and F037, K048, and K051 are not included in this listing.	Benzene	71-43-2	0.14	10
		Benzo(a)pyrene	50-32-8	0.061	3.4
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Chrysene	218-01-9	0.059	3.4
		Di-n-butyl phthalate	84-74-2	0.057	28
		Ethylbenzene	100-41-4	0.057	10
		Fluorene	86-73-7	0.059	NA
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-3	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.).	Acenaphthylene	208-96-8	0.059	3.4
		Acenaphthene	83-32-9	0.059	3.4
		Acetone	67-64-1	0.28	160
		Acetonitrile	75-05-8	5.6	NA
		Acetophenone	96-86-2	0.010	9.7
		2-Acetylaminofluorene	53-96-3	0.059	140
		Acrolein	107-02-8	0.29	NA
		Acrylonitrile	107-13-1	0.24	84
		Aldrin	309-00-2	0.021	0.066
		4-Aminobiphenyl	92-67-1	0.13	NA
		Aniline	62-53-3	0.81	14
		Anthracene	120-12-7	0.059	3.4
		Aramite	140-57-8	0.36	NA
		alpha-BHC	319-84-6	0.00014	0.066
		beta-BHC	319-85-7	0.00014	0.066
		delta-BHC	319-86-8	0.023	0.066
		gamma-BHC	58-89-9	0.0017	0.066
		Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Benzo(g,h,i)perylene	191-24-2	0.0055	1.8
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Bromodichloromethane	75-27-4	0.35	15
		Methyl bromide (Bromomethane)	74-83-9	0.11	15
		4-Bromophenyl phenyl ether	101-55-3	0.055	15
		n-Butyl alcohol	71-36-3	5.6	2.6
		Butyl benzyl phthalate	85-68-7	0.017	28
		2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	88-85-7	0.066	2.5
		Carbon disulfide	75-15-0	3.8	NA
		Carbon tetrachloride	56-23-5	0.057	6.0
		Chlordane (alpha and gamma isomers)	57-74-9	0.0033	0.26
		p-Chloroaniline	106-47-8	0.46	16
		Chlorobenzene	108-90-7	0.057	6.0
		Chlorobenzilate	510-15-6	0.10	NA
		2-Chloro-1,3-butadiene	126-99-8	0.057	NA
		Chlorodibromomethane	124-48-1	0.057	15
		Chloroethane	75-00-3	0.27	6.0
		bis(2-Chloroethoxy)methane	111-91-1	0.036	7.2

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		bis(2-Chloroethyl)ether	111-44-4	0.033	6.0
		Chloroform	67-66-3	0.046	6.0
		bis(2-Chloroisopropyl)ether	39638-32-9	0.055	7.2
		p-Chloro-m-cresol	59-50-7	0.018	14
		Chloromethane (Methyl chloride)	74-87-3	0.19	30
		2-Chloronaphthalene	91-58-7	0.055	5.6
		2-Chlorophenol	95-57-8	0.044	5.7
		3-Chloropropylene	107-05-1	0.036	30
		Chrysene	218-01-9	0.059	3.4
		o-Cresol	95-48-7	0.11	5.6
		m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
		p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
		Cyclohexanone	108-94-1	0.36	NA
		1,2-Dibromo-3-chloropropane	96-12-8	0.11	15
		Ethylene dibromide (1,2-Dibromoethane)	106-93-4	0.028	15
		Dibromomethane	74-95-3	0.11	15

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	0.72	10
		o,p'-DDD	53-19-0	0.023	0.087
		p,p'-DDD	72-54-8	0.023	0.087
		o,p'-DDE	3424-82-6	0.031	0.087
		p,p'-DDE	72-55-9	0.031	0.087
		o,p'-DDT	789-02-6	0.0039	0.087
		p,p'-DDT	50-29-3	0.0039	0.087
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Dibenz(a,e)pyrene	192-65-4	0.061	NA
		m-Dichlorobenzene	541-73-1	0.036	6.0
		o-Dichlorobenzene	95-50-1	0.088	6.0
		p-Dichlorobenzene	106-46-7	0.090	6.0
		Dichlorodifluoromethane	75-71-8	0.23	7.2
		1,1-Dichloroethane	75-34-3	0.059	6.0
		1,2-Dichloroethane	107-06-2	0.21	6.0
		1,1-Dichloroethylene	75-35-4	0.025	6.0
		trans-1,2-Dichloroethylene	156-60-5	0.054	30
		2,4-Dichlorophenol	120-83-2	0.044	14
		2,6-Dichlorophenol	87-65-0	0.044	14
		1,2-Dichloropropane	78-87-5	0.85	18

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		cis-1,3-Dichloropropylene	10061-01-5	0.036	18
		trans-1,3-Dichloropropylene	10061-02-6	0.036	18
		Dieldrin	60-57-1	0.017	0.13
		Diethyl phthalate	84-66-2	0.20	28
		2-4-Dimethyl phenol	105-67-9	0.036	14
		Dimethyl phthalate	131-11-3	0.047	28
		Di-n-butyl phthalate	84-74-2	0.057	28
		1,4-Dinitrobenzene	100-25-4	0.32	2.3
		4,6-Dinitro-o-cresol	534-52-1	0.28	160
		2,4-Dinitrophenol	51-28-5	0.12	160
		2,4-Dinitrotoluene	121-14-2	0.32	140
		2,6-Dinitrotoluene	606-20-2	0.55	28
		Di-n-octyl phthalate	117-84-0	0.017	28
		Di-n-propylnitrosamine	621-64-7	0.40	14
		1,4-Dioxane	123-91-1	12.0	170
		Diphenylamine (difficult to distinguish from diphenylnitrosamine)	122-39-4	0.92	NA
		Diphenylnitrosamine (difficult to distinguish from diphenylamine)	86-30-6	0.92	NA
		1,2-Diphenylhydrazine	122-66-7	0.087	NA

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Disulfoton	298-04-4	0.017	6.2
		Endosulfan I	939-98-8	0.023	0.066
		Endosulfan II	33213-6-5	0.029	0.13
		Endosulfan sulfate	1031-07-8	0.029	0.13
		Endrin	72-20-8	0.0028	0.13
		Endrin aldehyde	7421-93-4	0.025	0.13
		Ethyl acetate	141-78-6	0.34	33
		Ethyl cyanide (Propanenitrile)	107-12-0	0.24	360
		Ethyl benzene	100-41-4	0.057	10
		Ethyl ether	60-29-7	0.12	160
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Ethyl methacrylate	97-63-2	0.14	160
		Ethylene oxide	75-21-8	0.12	NA
		Famphur	52-85-7	0.017	15
		Fluoranthene	206-44-0	0.068	3.4
		Fluorene	86-73-7	0.059	3.4
		Heptachlor	76-44-8	0.0012	0.066
		Heptachlor epoxide	1024-57-3	0.016	0.066
		Hexachlorobenzene	118-74-1	0.055	10
		Hexachlorobutadiene	87-68-3	0.055	5.6
		Hexachlorocyclopentadiene	77-47-4	0.057	2.4

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
		Hexachloroethane	67-72-1	0.055	30
		Hexachloropropylene	1888-71-7	0.035	30
		Indeno (1,2,3-c,d) pyrene	193-39-5	0.0055	3.4
		Iodomethane	74-88-4	0.19	65
		Isobutyl alcohol	78-83-1	5.6	170
		Isodrin	465-73-6	0.021	0.066
		Isosafrole	120-58-1	0.081	2.6
		Kepone	143-50-8	0.0011	0.13
		Methacrylonitrile	126-98-7	0.24	84
		Methanol	67-56-1	5.6	NA
		Methapyrilene	91-80-5	0.081	1.5
		Methoxychlor	72-43-5	0.25	0.18
		3-Methylcholanthrene	56-49-5	0.0055	15
		4,4-Methylene bis(2-chloroaniline)	101-14-4	0.50	30
		Methylene chloride	75-09-2	0.089	30
		Methyl ethyl ketone	78-93-3	0.28	36
		Methyl isobutyl ketone	108-10-1	0.14	33

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Methyl methacrylate	80-62-6	0.14	160
		Methyl methansulfonate	66-27-3	0.018	NA
		Methyl parathion	298-00-0	0.014	4.6
		Naphthalene	91-20-3	0.059	5.6
		2-Naphthylamine	91-59-8	0.52	NA
		p-Nitroaniline	100-01-6	0.028	28
		Nitrobenzene	98-95-3	0.068	14
		5-Nitro-o-toluidine	99-55-8	0.32	28
		p-Nitrophenol	100-02-7	0.12	29
		N-Nitrosodiethylamine	55-18-5	0.40	28
		N-Nitrosodimethylamine	62-75-9	0.40	NA
		N-Nitroso-di-n-butylamine	924-16-3	0.40	17
		N-Nitrosomethylethylamine	10595-95-6	0.40	2.3
		N-Nitrosomorpholine	59-89-2	0.40	2.3
		N-Nitrosopiperidine	100-75-4	0.013	35
		N-Nitrosopyrrolidine	930-55-2	0.013	35
		Parathion	56-38-2	0.014	4.6
		Total PCBs (sum of all PCB isomers, or all Aroclors)	1336-36-3	0.10	10
		Pentachlorobenzene	608-93-5	0.055	10

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
		Pentachloronitrobenzene	82-68-8	0.055	4.8
		Pentachlorophenol	87-86-5	0.089	7.4
		Phenacetin	62-44-2	0.081	16
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Phorate	298-02-2	0.021	4.6
		Phthalic anhydride	85-44-9	0.055	NA
		Pronamide	23950-58-5	0.093	1.5
		Pyrene	129-00-0	0.067	8.2
		Pyridine	110-86-1	0.014	16
		Safrole	94-59-7	0.081	22
		Silvex (2,4,5-TP)	93-72-1	0.72	7.9
		2,4,5-T	93-76-5	0.72	7.9
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
		1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
		1,1,2,2-Tetrachloroethane	79-34-6	0.057	6.0
		Tetrachloroethylene	127-18-4	0.056	6.0
		2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4
		Toluene	108-88-3	0.080	10
		Toxaphene	8001-35-2	0.0095	2.6
		Bromoform (Tribromomethane)	75-25-2	0.63	15
		1,2,4-Trichlorobenzene	120-82-1	0.055	19
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		Trichloroethylene	79-01-6	0.054	6.0
		Trichloromonofluoromethane	75-69-4	0.020	30
		2,4,5-Trichlorophenol	95-95-4	0.18	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
		1,2,3-Trichloropropane	96-18-4	0.85	30
		1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.057	30
		tris(2,3-Dibromopropyl) phosphate	126-72-7	0.11	NA
		Vinyl chloride	75-01-4	0.27	6.0

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Antimony	7440-36-0	1.9	1.15 mg/l TCLP
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Barium	7440-39-3	1.2	21 mg/l TCLP
		Beryllium	7440-41-7	0.82	NA
		Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	NA
		Fluoride	16964-48-8	35	NA
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Mercury	7439-97-6	0.15	0.025 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Selenium	7782-49-2	0.82	5.7 mg/l TCLP
		Silver	7440-22-4	0.43	0.14 mg/l TCLP
		Sulfide	8496-25-8	14	NA
		Thallium	7440-28-0	1.4	NA
		Vanadium	7440-62-2	4.3	NA

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.	Naphthalene	91-20-3	0.059	5.6
		Pentachlorophenol	87-86-5	0.089	7.4
		Phenanthrene	85-01-8	0.059	5.6
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-3	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K003	Wastewater treatment sludge from the production of molybdate orange pigments.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K004	Wastewater treatment sludge from the production of zinc yellow pigments.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K005	Wastewater treatment sludge from the production of chrome green pigments.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous).	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
	Wastewater treatment sludge from the production of chrome oxide green pigments (hydrated).	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	NA

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K007	Wastewater treatment sludge from the production of iron blue pigments.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
K008	Oven residue from the production of chrome oxide green pigments.	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K009	Distillation bottoms from the production of acetaldehyde from ethylene.	Chloroform	67-66-3	0.046	6.0
K010	Distillation side cuts from the production of acetaldehyde from ethylene.	Chloroform	67-66-3	0.046	6.0
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile.	Acetonitrile	75-05-8	5.6	38
		Acrylonitrile	107-13-1	0.24	84
		Acrylamide	79-06-1	19	23
		Benzene	71-43-2	0.14	10
		Cyanide (Total)	57-12-5	1.2	590
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile.	Acetonitrile	75-05-8	5.6	38
		Acrylonitrile	107-13-1	0.24	84
		Acrylamide	79-06-1	19	23
		Benzene	71-43-2	0.14	10
		Cyanide (Total)	57-12-5	1.2	590
K014	Bottoms from the acetonitrile purification column in the production of acrylonitrile.	Acetonitrile	75-05-8	5.6	38
		Acrylonitrile	107-13-1	0.24	84
		Acrylamide	79-06-1	19	23

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Benzene	71-43-2	0.14	10
		Cyanide (Total)	57-12-5	1.2	590
K015	Still bottoms from the distillation of benzyl chloride.	Anthracene	120-12-7	0.059	3.4
		Benzal chloride	98-87-3	0.055	6.0
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Phenanthrene	85-01-8	0.059	5.6
		Toluene	108-88-3	0.080	10
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
K016	Heavy ends or distillation residues from the production of carbon tetrachloride.	Hexachlorobenzene	118-74-1	0.055	10
		Hexachlorobutadiene	87-68-3	0.055	5.6
		Hexachlorocyclopentadiene	77-47-4	0.057	2.4
		Hexachloroethane	67-72-1	0.055	30
		Tetrachloroethylene	127-18-4	0.056	6.0
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin.	bis(2-Chloroethyl)ether	111-44-4	0.033	6.0
		1,2-Dichloropropane	78-87-5	0.85	18
		1,2,3-Trichloropropane	96-18-4	0.85	30
K018	Heavy ends from the fractionation column in ethyl chloride production.	Chloroethane	75-00-3	0.27	6.0

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Chloromethane	74-87-3	0.19	NA
		1,1-Dichloroethane	75-34-3	0.059	6.0
		1,2-Dichloroethane	107-06-2	0.21	6.0
		Hexachlorobenzene	118-74-1	0.055	10
		Hexachlorobutadiene	87-68-3	0.055	5.6
		Hexachloroethane	67-72-1	0.055	30
		Pentachloroethane	76-01-7	NA	6.0
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production.	bis(2-Chloroethyl)ether	111-44-4	0.033	6.0
		Chlorobenzene	108-90-7	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		p-Dichlorobenzene	106-46-7	0.090	NA
		1,2-Dichloroethane	107-06-2	0.21	6.0
		Fluorene	86-73-7	0.059	NA
		Hexachloroethane	67-72-1	0.055	30
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	NA
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,2,4-Trichlorobenzene	120-82-1	0.055	19
		1,1,1-Trichloroethane	71-55-6	0.054	6.0

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production.	1,2-Dichloroethane	107-06-2	0.21	6.0
		1,1,2,2-Tetrachloroethane	79-34-6	0.057	6.0
		Tetrachloroethylene	127-18-4	0.056	6.0
K021	Aqueous spent antimony catalyst waste from fluoromethanes production.	Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Antimony	7440-36-0	1.9	1.15 mg/l TCLP
K022	Distillation bottom tars from the production of phenol/acetone from cumene.	Toluene	108-88-3	0.080	10
		Acetophenone	96-86-2	0.010	9.7
		Diphenylamine (difficult to distinguish from diphenylnitrosamine)	122-39-4	0.92	13
		Diphenylnitrosamine (difficult to distinguish from diphenylamine)	86-30-6	0.92	13
		Phenol	108-95-2	0.039	6.2
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
K023	Distillation light ends from the production of phthalic anhydride from naphthalene.	Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	100-21-0	0.055	28
		Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	85-44-9	0.055	28
K024	Distillation bottoms from the production of phthalic anhydride from naphthalene.	Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	100-21-0	0.055	28

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	85-44-9	0.055	28
K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene.	NA	NA	LLEXT fb SSTRP fb CARBN; or CMBST	CMBST
K026	Stripping still tails from the production of methyl ethyl pyridines.	NA	NA	CMBST	CMBST
K027	Centrifuge and distillation residues from toluene diisocyanate production.	NA	NA	CARBN; or CMBST	CMBST
K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.	1,1-Dichloroethane	75-34-3	0.059	6.0
		trans-1,2-Dichloroethylene	156-60-5	0.054	30
		Hexachlorobutadiene	87-68-3	0.055	5.6
		Hexachloroethane	67-72-1	0.055	30
		Pentachloroethane	76-01-7	NA	6.0
		1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
		1,1,2,2-Tetrachloroethane	79-34-6	0.057	6.0
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		Cadmium	7440-43-9	0.69	NA
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K029	Waste from the product steam stripper in the production of 1,1,1-trichloroethane.	Chloroform	67-66-3	0.046	6.0
		1,2-Dichloroethane	107-06-2	0.21	6.0
		1,1-Dichloroethylene	75-35-4	0.025	6.0
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
		Vinyl chloride	75-01-4	0.27	6.0
K030	Column bodies or heavy ends from the combined production of trichloroethylene and perchloroethylene.	o-Dichlorobenzene	95-50-1	0.088	NA
		p-Dichlorobenzene	106-46-7	0.090	NA
		Hexachlorobutadiene	87-68-3	0.055	5.6
		Hexachloroethane	67-72-1	0.055	30
		Hexachloropropylene	1888-71-7	NA	30
		Pentachlorobenzene	608-93-5	NA	10
		Pentachloroethane	76-01-7	NA	6.0
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,2,4-Trichlorobenzene	120-82-1	0.055	19
K031	By-product salts generated in the production of MSMA and cacodylic acid.	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
K032	Wastewater treatment sludge from the production of chlordane.	Hexachlorocyclopentadiene	77-47-4	0.057	2.4
		Chlordane (alpha and gamma isomers)	57-74-9	0.0033	0.26
		Heptachlor	76-44-8	0.0012	0.066
		Heptachlor epoxide	1024-57-3	0.016	0.066

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.	Hexachlorocyclopentadiene	77-47-4	0.057	2.4
K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.	Hexachlorocyclopentadiene	77-47-4	0.057	2.4
K035	Wastewater treatment sludges generated in the production of creosote.	Acenaphthene	83-32-9	NA	3.4
		Anthracene	120-12-7	NA	3.4
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Chrysene	218-01-9	0.059	3.4
		o-Cresol	95-48-7	0.11	5.6
		m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
		p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
		Dibenz(a,h)anthracene	53-70-3	NA	8.2
		Fluoranthene	206-44-0	0.068	3.4
		Fluorene	86-73-7	NA	3.4
		Indeno(1,2,3-cd)pyrene	193-39-5	NA	3.4
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Pyrene	129-00-0	0.067	8.2
K036	Still bottoms from toluene reclamation distillation in the production of disulfoton.	Disulfoton	298-04-4	0.017	6.2
K037	Wastewater treatment sludges from the production of disulfoton.	Disulfoton	298-04-4	0.017	6.2
		Toluene	108-88-3	0.080	10
K038	Wastewater from the washing and stripping of phorate production.	Phorate	298-02-2	0.021	4.6
K039	Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.	NA	NA	CARBN; or CMBST	CMBST
K040	Wastewater treatment sludge from the production of phorate.	Phorate	298-02-2	0.021	4.6
K041	Wastewater treatment sludge from the production of toxaphene.	Toxaphene	8001-35-2	0.0095	2.6
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.	o-Dichlorobenzene	95-50-1	0.088	6.0
		p-Dichlorobenzene	106-46-7	0.090	6.0
		Pentachlorobenzene	608-93-5	0.055	10
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		1,2,4-Trichlorobenzene	120-82-1	0.055	19
K043	2,6-Dichlorophenol waste from the production of 2,4-D.	2,4-Dichlorophenol	120-83-2	0.044	14
		2,6-Dichlorophenol	187-65-0	0.044	14
		2,4,5-Trichlorophenol	95-95-4	0.18	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
		2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Pentachlorophenol	87-86-5	0.089	7.4
		Tetrachloroethylene	127-18-4	0.056	6.0
		HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
K044	Wastewater treatment sludges from the manufacturing and processing of explosives.	NA	NA	DEACT	DEACT
K045	Spent carbon from the treatment of wastewater containing explosives.	NA	NA	DEACT	DEACT
K046	Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.	Lead	7439-92-1	0.69	0.75 mg/l TCLP
K047	Pink/red water form TNT operations	NA	NA	DEACT	DEACT
K048	Dissolved air flotation (DAF) float from the petroleum refining industry.	Benzene	71-43-2	0.14	10
		Benzo(a)pyrene	50-32-8	0.061	3.4

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Chrysene	218-01-9	0.059	3.4
		Di-n-butyl phthalate	84-74-2	0.057	28
		Ethylbenzene	100-41-4	0.057	10
		Fluorene	86-73-7	0.059	NA
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-33	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP
K049	Slop oil emulsion solids from the petroleum refining industry.	Anthracene	120-12-7	0.059	3.4
		Benzene	71-43-2	0.14	10
		Benzo(a)pyrene	50-32-8	0.061	3.4
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Carbon disulfide	75-15-0	3.8	NA

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Chrysene	2218-01-9	0.059	3.4
		2,4-Dimethylphenol	105-67-9	0.036	NA
		Ethylbenzene	100-41-4	0.057	10
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-3	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Cyanides (Total)[7]	57-12-5	1.2	590
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP
K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry.	Benzo(a)pyrene	50-32-8	0.061	3.4
		Phenol	108-95-2	0.039	6.2
		Cyanides (Total)[7]	57-12-5	1.2	590
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K051	API separator sludge from the petroleum refining industry.	Acenaphthene	83-32-9	0.059	NA
		Anthracene	120-12-7	0.059	3.4
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzene	71-43-2	0.14	10
		Benzo(a)pyrene	50-32-8	0.061	3.4
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		Chrysene	2218-01-9	0.059	3.4
		Di-n-butyl phthalate	105-67-9	0.057	28
		Ethylbenzene	100-41-4	0.057	10
		Fluorene	86-73-7	0.059	NA
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-3	0.08	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Cyanides (Total)[7]	57-12-5	1.2	590
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K052	Tank bottoms (leaded) from the petroleum refining industry.	Benzene	71-43-2	0.14	10
		Benzo(a)pyrene	50-32-8	0.061	3.4
		o-Cresol	95-48-7	0.11	5.6
		m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
		p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
		2,4-Dimethylphenol	105-67-9	0.036	NA
		Ethylbenzene	100-41-4	0.057	10
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Toluene	108-88-3	0.08	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Lead	7439-92-1	0.69	NA
		Nickel	7440-02-0	NA	11 mg/l TCLP
K060	Ammonia still lime sludge from coking operations.	Benzene	71-43-2	0.14	10

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Naphthalene	91-20-3	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Cyanides (Total)[7]	57-12-5	1.2	590
K061	Emission control dust/sludge from the primary production of steel in electric furnaces.	Antimony	7440-36-0	NA	1.15 mg/l TCLP
		Arsenic	7440-38-2	NA	5.0 mg/l TCLP
		Barium	7440-39-3	NA	21 mg/l TCLP
		Beryllium	7440-41-7	NA	1.22 mg/l TCLP
		Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Mercury	7439-97-6	NA	0.025 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Selenium	7782-49-2	NA	5.7 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
		Thallium	7440-28-0	NA	0.20 mg/l TCLP
		Zinc	7440-66-6	NA	4.3 mg/l TCLP
K062	Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	NA

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K069	Emission control dust/sludge from secondary lead smelting. - Calcium Sulfate (Low Lead) Subcategory	Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
	Emission control dust/sludge from secondary lead smelting. - Non-Calcium Sulfate (High Lead) Subcategory	NA	NA	NA	RLEAD
K071	K071 (Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used) nonwastewaters that are residues from RMERC.	Mercury	7439-97-6	NA	0.20 mg/l TCLP
	K071 (Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.) nonwastewaters that are not residues from RMERC.	Mercury	7439-97-6	NA	0.025 mg/l TCLP
	All K071 wastewaters.	Mercury	7439-97-6	0.15	NA
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production.	Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Hexachloroethane	67-72-1	0.055	30
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
K083	Distillation bottoms from aniline production.	Aniline	62-53-3	0.81	14
		Benzene	71-43-2	0.14	10
		Cyclohexanone	108-94-1	0.36	NA
		Diphenylamine (difficult to distinguish from diphenylnitrosamine)	122-39-4	0.92	13

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Diphenylnitrosamine (difficult to distinguish from diphenylamine)	86-30-6	0.92	13
		Nitrobenzene	98-95-3	0.068	14
		Phenol	108-95-2	0.039	6.2
		Nickel	7440-02-0	3.98	11 mg/l TCLP
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
K085	Distillation or fractionation column bottoms from the production of chlorobenzenes.	Benzene	71-43-2	0.14	10
		Chlorobenzene	108-90-7	0.057	6.0
		m-Dichlorobenzene	541-73-1	0.036	6.0
		o-Dichlorobenzene	95-50-1	0.088	6.0
		p-Dichlorobenzene	106-46-7	0.090	6.0
		Hexachlorobenzene	118-74-1	0.055	10
		Total PCBs (sum of all PCB isomers, or all Aroclors)	1336-36-3	0.10	10
		Pentachlorobenzene	608-93-5	0.055	10
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		1,2,4-Trichlorobenzene	120-82-1	0.055	19

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K086	Solvent wastes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.	Acetone	67-64-1	0.28	160
		Acetophenone	96-86-2	0.010	9.7
		bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
		n-Butyl alcohol	71-36-3	5.6	2.6
		Butylbenzyl phthalate	85-68-7	0.017	28
		Cyclohexanone	108-94-1	0.36	NA
		o-Dichlorobenzene	95-50-1	0.088	6.0
		Diethyl phthalate	84-66-2	0.20	28
		Dimethyl phthalate	131-11-3	0.047	28
		Di-n-butyl phthalate	84-74-2	0.057	28
		Di-n-octyl phthalate	117-84-0	0.017	28
		Ethyl acetate	141-78-6	0.34	33
		Ethylbenzene	100-41-4	0.057	10
		Methanol	67-56-1	5.6	NA
		Methyl ethyl ketone	78-93-3	0.28	36
		Methyl isobutyl ketone	108-10-1	0.14	33
		Methylene chloride	75-09-2	0.089	30
		Naphthalene	91-20-3	0.059	5.6
		Nitrobenzene	98-95-3	0.068	14
		Toluene	108-88-3	0.080	10
		1,1,1-Trichloroethane	71-55-6	0.054	6.0

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Trichloroethylene	79-01-6	0.054	6.0
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K087	Decanter tank tar sludge from coking operations.	Acenaphthylene	208-96-8	0.059	3.4
		Benzene	71-43-2	0.14	10
		Chrysene	218-01-9	0.059	3.4
		Fluoranthene	206-44-0	0.068	3.4
		Indeno(1,2,3-cd)pyrene	193-39-5	0.0055	3.4
		Naphthalene	91-20-3	0.059	5.6
		Phenanthrene	85-01-8	0.059	5.6
		Toluene	108-88-3	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K088	Spent potliners from primary aluminum reduction.	Acenaphthene	83-32-9	0.059	3.4
		Anthracene	120-12-7	0.059	3.4
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Benzo(b)fluoranthene	205-99-2	0.11	6.8
		Benzo(k)fluoranthene	207-08-9	0.11	6.8
		Benzo(g,h,i)perylene	191-24-2	0.0055	1.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Fluoranthene	206-44-0	0.068	3.4
		Indeno(1,2,3,-c,d)pyrene	193-39-5	0.0055	3.4
		Phenanthrene	85-01-8	0.059	5.6
		Pyrene	129-00-0	0.067	8.2
		Antimony	7440-36-0	1.9	1.15 mg/l TCLP
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Barium	7440-39-3	1.2	21 mg/l TCLP
		Beryllium	7440-41-7	0.82	1.22 mg/l TCLP
		Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Mercury	7439-97-6	0.15	0.025 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Selenium	7782-49-2	0.82	5.7 mg/l TCLP
		Silver	7440-22-4	0.43	0.14 mg/l TCLP
		Cyanide (Total)[7]	57-12-5	1.2	590

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Cyanide (Amenable)[7]	57-12-5	0.86	30
		Fluoride	16984-48-8	35	48 mg/l TCLP
K093	Distillation light ends from the production of phthalic anhydride from ortho-xylene.	Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	100-21-0	0.055	28
		Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	85-44-9	0.055	28
K094	Distillation bottoms from the production of phthalic anhydride from ortho-xylene.	Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	100-21-0	0.055	28
		Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	85-44-9	0.055	28
K095	Distillation bottoms from the production of 1,1,1-trichloroethane.	Hexachloroethane	67-72-1	0.055	30
		Pentachloroethane	76-01-7	0.055	6.0
		1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
		1,1,2,2-Tetrachloroethane	79-34-6	0.057	6.0
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		Trichloroethylene	79-01-6	0.054	6.0
K096	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.	m-Dichlorobenzene	541-73-1	0.036	6.0
		Pentachloroethane	76-01-7	0.055	6.0
		1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		1,1,2,2-Tetrachloroethane	79-34-6	0.057	6.0
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,2,4-Trichlorobenzene	120-82-1	0.055	19
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		Trichloroethylene	79-01-6	0.054	6.0
K097	Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.	Chlordane (alpha and gamma isomers)	57-74-9	0.0033	0.26
		Heptachlor	76-44-8	0.0012	0.066
		Heptachlor epoxide	1024-57-3	0.016	0.066
		Hexachlorocyclopentadiene	77-47-4	0.057	2.4
K098	Untreated process wastewater from the production of toxaphene.	Toxaphene	8001-35-2	0.0095	2.6
K099	Untreated wastewater from the production of 2,4-D.	2,4-Dichlorophenoxyacetic acid	94-75-7	0.72	10
		HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
		PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
		TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.	Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
K101	Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	o-Nitroaniline	88-74-4	0.27	14
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Cadmium	7440-43-9	0.69	NA
		Lead	7439-92-1	0.69	NA
		Mercury	7439-97-6	0.15	NA
K102	Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.	o-Nitrophenol	88-75-5	0.028	13
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Cadmium	7440-43-9	0.69	NA
		Lead	7439-92-1	0.69	NA
		Mercury	7439-97-6	0.15	NA
K103	Process residues from aniline extraction from the production of aniline.	Aniline	62-53-3	0.81	14
		Benzene	71-43-2	0.14	10
		2,4-Dinitrophenol	51-28-5	0.12	160
		Nitrobenzene	98-95-3	0.068	14
		Phenol	108-95-2	0.039	6.2

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K104	Combined wastewater streams generated from nitrobenzene/ aniline production.	Aniline	62-53-3	0.81	14
		Benzene	71-43-2	0.14	10
		2,4-Dinitrophenol	51-28-5	0.12	160
		Nitrobenzene	98-95-3	0.068	14
		Phenol	108-95-2	0.039	6.2
		Cyanides (Total)[7]	57-12-5	1.2	590
K105	Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.	Benzene	71-43-2	0.14	10
		Chlorobenzene	108-90-7	0.057	6.0
		2-Chlorophenol	95-57-8	0.044	5.7
		o-Dichlorobenzene	95-50-1	0.088	6.0
		p-Dichlorobenzene	106-46-7	0.090	6.0
		Phenol	108-95-2	0.039	6.2
		2,4,5-Trichlorophenol	95-95-4	0.18	7.4
		2,4,6-Trichlorophenol	88-06-2	0.035	7.4
K106	K106 (wastewater treatment sludge from the mercury cell process in chlorine production) nonwastewaters that contain greater than or equal to 260 mg/kg total mercury.	Mercury	7439-97-6	NA	RMERC
	K106 (wastewater treatment sludge from the mercury cell process in chlorine production) nonwastewaters that contain less than 260 mg/kg total mercury that are residues from RMERC.	Mercury	7439-97-6	NA	0.20 mg/l TCLP
	Other K106 nonwastewaters that contain less than 260 mg/kg total mercury and are not residues from RMERC.	Mercury	7439-97-6	NA	0.025 mg/l TCLP

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	All K106 wastewaters.	Mercury	7439-97-6	0.15	NA
K107	Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	NA	NA	CMBST; or CHOXD fb CARBN; or BIODG fb CARBN	CMBST
K108	Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	NA	NA	CMBST; or CHOXD fb CARBN; or BIODG fb CARBN	CMBST
K109	Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	NA	NA	CMBST; or CHOXD fb CARBN; or BIODG fb CARBN	CMBST
K110	Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.	NA	NA	CMBST; or CHOXD fb CARBN; or BIODG fb CARBN	CMBST
K111	Product washwaters from the production of dinitrotoluene via nitration of toluene	2,4-Dinitrotoluene	121-1-2	0.32	140
		2,6-Dinitrotoluene	606-20-2	0.55	28
K112	Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.	NA	NA	CMBST; or CHOXD fb CARBN; or BIODG fb CARBN	CMBST
K113	Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	NA	NA	CARBN; OR CMBST	CMBST
K114	Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotolune.	NA	NA	CARBN; or CMBST	CMBST
K115	Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.	Nickel	7440-02-0	3.98	11 mg/l TCLP
		NA	NA	CARBN; or CMBST	CMBST

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K116	Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine.	NA	NA	CARBN; or CMBST	CMBST
K117	Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene.	Methyl bromide (Bromomethane)	74-83-9	0.11	15
		Chloroform	67-66-3	0.046	6.0
		Ethylene dibromide (1,2-Dibromoethane)	106-93-4	0.028	15
K118	Spent absorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	Methyl bromide (Bromomethane)	74-83-9	0.11	15
		Chloroform	67-66-3	0.046	6.0
		Ethylene dibromide (1,2-Dibromoethane)	106-93-4	0.028	15
K123	Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.	NA	NA	CMBST; or CHOXD fb (BIODG or CARBN)	CMBST
K124	Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.	NA	NA	CMBST; or CHOXD fb (BIODG or CARBN)	CMBST
K125	Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.	NA	NA	CMBST; or CHOXD fb (BIODG or CARBN)	CMBST
K126	Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.	NA	NA	CMBST; or CHOXD fb (BIODG or CARBN)	CMBST
K131	Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide.	Methyl bromide (Bromomethane)	74-83-9	0.11	15

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K132	Spent absorbent and wastewater separator solids from the production of methyl bromide.	Methyl bromide (Bromomethane)	74-83-9	0.11	15
K136	Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.	Methyl bromide (Bromomethane)	74-83-9	0.11	15
		Chloroform	67-66-3	0.046	6.0
		Ethylene dibromide (1,2-Dibromoethane)	106-93-4	0.028	15
K140	Floor sweepings, off-specification product, and spent filter media from the production of 2,4,6-tribromophenol.	2,4,6-Tribromophenol	118-79-6	0.035	7.4
K141	Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludge from coking operations).	Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-2-8	0.061	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Indeno(1,2,3-cd)pyrene	193-39-5	0.0055	3.4
K142	Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal.	Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Indeno(1,2,3-cd)pyrene	193-39-5	0.0055	3.4
K143	Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal.	Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)flouranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Chrysene	218-01-9	0.059	3.4
K144	Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.	Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
K145	Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.	Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Naphthalene	91-20-3	0.059	5.6
K147	Tar storage tank residues from coal tar refining.	Benzene	71-43-2	0.14	10
		Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Indeno(1,2,3-cd)pyrene	193-39-5	0.0055	3.4

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K148	Residues from coal tar distillation, including, but not limited to, still bottoms.	Benz(a)anthracene	56-55-3	0.059	3.4
		Benzo(a)pyrene	50-32-8	0.061	3.4
		Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
		Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
		Chrysene	218-01-9	0.059	3.4
		Dibenz(a,h)anthracene	53-70-3	0.055	8.2
		Indeno(1,2,3-cd)pyrene	193-39-5	0.0055	3.4
K149	Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. (This waste does not include still bottoms from the distillations of benzyl chloride.)	Chlorobenzene	108-90-7	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Chloromethane	74-87-3	0.19	30
		p-Dichlorobenzene	106-46-7	0.090	6.0
		Hexachlorobenzene	118-74-1	0.055	10
		Pentachlorobenzene	608-93-5	0.055	10
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		Toluene	108-88-3	0.080	10
K150	Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Chloromethane	74-87-3	0.19	30
		p-Dichlorobenzene	106-46-7	0.090	6.0

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Hexachlorobenzene	118-74-1	0.055	10
		Pentachlorobenzene	608-93-5	0.055	10
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		1,1,2,2-Tetrachloroethane	79-34-5	0.057	6.0
		Tetrachloroethylene	127-18-4	0.056	6.0
		1,2,4-Trichlorobenzene	120-82-1	0.055	19
K151	Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.	Benzene	71-43-2	0.14	10
		Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Hexachlorobenzene	118-74-1	0.055	10
		Pentachlorobenzene	608-93-5	0.055	10
		1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
		Tetrachloroethylene	127-18-4	0.056	6.0
		Toluene	108-88-3	0.080	10
K156	Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. [10]	Acetonitrile	75-05-8	5.6	38
		Acetophenone	96-86-2	0.010	9.7
		Aniline	62-53-3	0.81	14
		Benomyl	17804-35-2	0.056	1.4
		Benzene	71-43-2	0.14	10
		Carbaryl	63-25-2	0.006	0.14

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Carbenzadim	10605-21-7	0.056	1.4
		Carbofuran	1563-66-2	0.006	0.14
		Carbosulfan	55285-14-8	0.028	1.4
		Chlorobenzene	108-90-7	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		o-Dichlorobenzene	95-50-1	0.088	6.0
		Methomyl	16752-77-5	0.028	0.14
		Methylene chloride	75-09-2	0.089	30
		Methyl ethyl ketone	78-93-3	0.28	36
		Naphthalene	91-20-3	0.059	5.6
		Phenol	108-95-2	0.039	6.2
		Pyridine	110-86-1	0.014	16
		Toluene	108-88-3	0.080	10
		Triethylamine	121-44-8	0.081	1.5
K157	Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. [10]	Carbon tetrachloride	56-23-5	0.057	6.0
		Chloroform	67-66-3	0.046	6.0
		Chloromethane	74-87-3	0.19	30
		Methomyl	16752-77-5	0.028	0.14
		Methylene chloride	75-09-2	0.089	30

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Methyl ethyl ketone	78-93-3	0.28	36
		o-Phenylenediamine	95-54-5	0.056	5.6
		Pyridine	110-86-1	0.014	16
		Triethylamine	121-44-8	0.081	1.5
K158	Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. [10]	Benomyl	17804-35-2	0.056	1.4
		Benzene	71-43-2	0.14	10
		Carbenzadim	10605-21-7	0.056	1.4
		Carbofuran	1563-66-2	0.006	0.14
		Carbosulfan	55285-14-8	0.028	1.4
		Chloroform	67-66-3	0.046	6.0
		Methylene chloride	75-09-2	0.089	30
		Phenol	108-95-2	0.039	6.2
K159	Organics from the treatment of thiocarbamate wastes. [10]	Benzene	71-43-2	0.14	10
		Butylate	2008-41-5	0.042	1.4
		EPTC (Eptam)	759-94-4	0.042	1.4
		Molinate	2212-67-1	0.042	1.4
		Pebulate	1114-71-2	0.042	1.4
		Vernolate	1929-77-7	0.042	1.4

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
K161	Purification solids (including filtration, evaporation, and centrifugation solids), baghouse dust and floor sweepings from the production of dithiocarbamate acids and their salts. [10]	Antimony	7440-36-0	1.9	1.15 mg/l TCLP
		Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
		Carbon disulfide	75-15-0	3.8	4.8 mg/l TCLP
		Dithiocarbamates (total)	NA	0.028	28
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Selenium	7782-49-2	0.82	5.7 mg/l TCLP
P001	Warfarin, & salts, when present at concentrations greater than 0.3%	Warfarin	81-81-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P002	1-Acetyl-2-thiourea	1-Acetyl-2-thiourea	591-08-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P003	Acrolein	Acrolein	107-02-8	0.29	CMBST
P004	Aldrin	Aldrin	309-00-2	0.021	0.066
P005	Allyl alcohol	Allyl alcohol	107-18-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P006	Aluminum phosphide	Aluminum phosphide	20859-73-8	CHOXD; CHRED; or CMBST	CHOXD; CHRED; or CMBST
P007	5-Aminomethyl 3-isoxazolol	5-Aminomethyl 3-isoxazolol	2763-96-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P008	4-Aminopyridine	4-Aminopyridine	504-24-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P009	Ammonium picrate	Ammonium picrate	131-74-8	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
P010	Arsenic acid	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P011	Arsenic pentoxide	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
P012	Arsenic trioxide	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
P013	Barium cyanide	Barium	7440-39-3	NA	21 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P014	Thiophenol (Benzene thiol)	Thiophenol (Benzene thiol)	108-98-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P015	Beryllium dust	Beryllium	7440-41-7	RMETL; or RTHRM	RMETL; or RTHRM
P016	Dichloromethyl ether (Bis(chloromethyl)ether)	Dichloromethyl ether	542-88-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P017	Bromoacetone	Bromoacetone	598-31-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P018	Brucine	Brucine	357-57-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P020	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	2-sec-Butyl-4,6-dinitrophenol (Dinoseb)	88-85-7	0.066	2.5
P021	Calcium cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P022	Carbon disulfide	Carbon disulfide	75-15-0	3.8	CMBST
		Carbon disulfide; alternate[6] standard for nonwastewaters only	75-15-0	NA	4.8 mg/l TCLP
P023	Chloroacetaldehyde	Chloroacetaldehyde	107-20-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P024	p-Chloroaniline	p-Chloroaniline	106-47-8	0.46	16

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P026	1-(o-Chlorophenyl)thiourea	1-(o-Chlorophenyl)thiourea	5344-82-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P027	3-Chloropropionitrile	3-Chloropropionitrile	542-76-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P028	Benzyl chloride	Benzyl chloride	100-44-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P029	Copper cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P030	Cyanides (soluble salts and complexes)	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P031	Cyanogen	Cyanogen	460-19-5	CHOXD; WETOX; or CMBST	CHOXD; WETOX; or CMBST
P033	Cyanogen chloride	Cyanogen chloride	506-77-4	CHOXD; WETOX; or CMBST	CHOXD; WETOX; or CMBST
P034	2-Cyclohexyl-4,6-dinitrophenol	2-Cyclohexyl-4,6-dinitrophenol	131-89-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P036	Dichlorophenylarsine	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
P037	Dieldrin	Dieldrin	60-57-1	0.017	0.13
P038	Diethylarsine	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
P039	Disulfoton	Disulfoton	298-04-4	0.017	6.2
P040	0,0-Diethyl O-pyrazinyl phosphorothioate	0,0-Diethyl O-pyrazinyl phosphorothioate	297-97-2	CARBN; or CMBST	CMBST
P041	Diethyl-p-nitrophenyl phosphate	Diethyl-p-nitrophenyl phosphate	311-45-5	CARBN; or CMBST	CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P042	Epinephrine	Epinephrine	51-43-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P043	Diisopropylfluorophosphate (DFP)	Diisopropylfluorophosphate (DFP)	55-91-4	CARBN; or CMBST	CMBST
P044	Dimethoate	Dimethoate	60-51-5	CARBN; or CMBST	CMBST
P045	Thiofanox	Thiofanox	39196-18-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P046	alpha, alpha-Dimethylphenethylamine	alpha, alpha-Dimethylphenethylamine	122-09-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P047	4,6-Dinitro-o-cresol	4,6-Dinitro-o-cresol	543-52-1	0.28	160
	4,6-Dinitro-o-cresol salts	NA	NA	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P048	2,4-Dinitrophenol	2,4-Dinitrophenol	51-28-5	0.12	160
P049	Dithiobiuret	Dithiobiuret	541-53-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P050	Endosulfan	Endosulfan I	939-98-8	0.023	0.066
		Endosulfan II	33213-6-5	0.029	0.13
		Endosulfan sulfate	1031-07-8	0.029	0.13
P051	Endrin	Endrin	72-20-8	0.0028	0.13
		Endrin aldehyde	7421-93-4	0.025	0.13
P054	Aziridine	Aziridine	151-56-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P056	Fluorine	Fluoride (measured in wastewaters only)	16964-48-8	35	ADGAS fb NEUTR

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P057	Fluoroacetamide	Fluoroacetamide	640-19-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P058	Fluoroacetic acid, sodium salt	Fluoroacetic acid, sodium salt	62-74-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P059	Heptachlor	Heptachlor	76-44-8	0.0012	0.066
		Heptachlor epoxide	1024-57-3	0.016	0.066
P060	Isodrin	Isodrin	465-73-6	0.021	0.066
P062	Hexaethyl tetraphosphate	Hexaethyl tetraphosphate	757-58-4	CARBN; or CMBST	CMBST
P063	Hydrogen cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P064	Isocyanic acid, ethyl ester	Isocyanic acid, ethyl ester	624-83-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P065	Mercury fulminate nonwastewaters, regardless of their total mercury content, that are not incinerator residues or are not residues from RMERC.	Mercury	7439-97-6	NA	IMERC
	Mercury fulminate nonwastewaters that are either incinerator residues or are residues from RMERC; and contain greater than or equal to 260 mg/kg total mercury.	Mercury	7439-97-6	NA	RMERC
	Mercury fulminate nonwastewaters that are residues from RMERC and contain less than 260 mg/kg total mercury.	Mercury	7439-97-6	NA	0.20 mg/l TCLP
	Mercury fulminate nonwastewaters that are incinerator residues and contain less than 260 mg/kg total mercury.	Mercury	7439-97-6	NA	0.025 mg/l TCLP
	All mercury fulminate wastewaters.	Mercury	7439-97-6	0.15	NA

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P066	Methomyl	Methomyl	16752-77-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P067	2-Methyl-aziridine	2-Methyl-aziridine	75-55-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P068	Methyl hydrazine	Methyl hydrazine	60-34-4	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
P069	2-Methyllactonitrile	2-Methyllactonitrile	75-86-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P070	Aldicarb	Aldicarb	116-06-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P071	Methyl parathion	Methyl parathion	298-00-0	0.014	4.6
P072	1-Naphthyl-2-thiourea	1-Naphthyl-2-thiourea	86-88-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P073	Nickel carbonyl	Nickel	7440-02-0	3.98	11 mg/l TCLP
P074	Nickel cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Nickel	7440-02-0	3.98	11 mg/l TCLP
P075	Nicotine and salts	Nicotine and salts	54-11-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P076	Nitric oxide	Nitric oxide	10102-43-9	ADGAS	ADGAS
P077	p-Nitroaniline	p-Nitroaniline	100-01-6	0.028	28
P078	Nitrogen dioxide	Nitrogen dioxide	10102-44-0	ADGAS	ADGAS

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P081	Nitroglycerin	Nitroglycerin	55-63-0	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
P082	N-Nitrosodimethylamine	N-Nitrosodimethylamine	62-75-9	0.40	2.3
P084	N-Nitrosomethylvinylamine	N-Nitrosomethylvinylamine	4549-40-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P085	Octamethylpyrophosphoramide	Octamethylpyrophosphoramide	152-16-9	CARBN; or CMBST	CMBST
P087	Osmium tetroxide	Osmium tetroxide	20816-12-0	RMETL; or RTHRM	RMETL; or RTHRM
P088	Endothall	Endothall	145-73-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P089	Parathion	Parathion	56-38-2	0.014	4.6
P092	Phenyl mercuric acetate nonwastewaters, regardless of their total mercury content, that are not incinerator residues or are not residues from RMERC.	Mercury	7439-97-6	NA	IMERC; or RMERC
	Phenyl mercuric acetate nonwastewaters that are either incinerator residues or are residues from RMERC; and still contain greater than or equal to 260 mg/kg total mercury.	Mercury	7439-97-6	NA	RMERC
	Phenyl mercuric acetate nonwastewaters that are residues from RMERC and contain less than 260 mg/kg total mercury.	Mercury	7439-97-6	NA	0.20 mg/l TCLP
	Phenyl mercuric acetate nonwastewaters that are incinerator residues and contain less than 260 mg/kg total mercury.	Mercury	7439-97-6	NA	0.025 mg/l TCLP
	All phenyl mercuric acetate wastewaters.	Mercury	7439-97-6	0.15	NA

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P093	Phenylthiourea	Phenylthiourea	103-85-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P094	Phorate	Phorate	298-02-2	0.021	4.6
P095	Phosgene	Phosgene	75-44-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P096	Phosphine	Phosphine	7803-51-2	CHOXD; CHRED; or CMBST	CHOXD; CHRED; or CMBST
P097	Famphur	Famphur	52-85-7	0.017	15
P098	Potassium cyanide.	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P099	Potassium silver cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Silver	7440-22-4	0.43	0.14 mg/l TCLP
P101	Ethyl cyanide (Propanenitrile)	Ethyl cyanide (Propanenitrile)	107-12-0	0.24	360
P102	Propargyl alcohol	Propargyl alcohol	107-19-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P103	Selenourea	Selenium	7782-49-2	0.82	5.7 mg/l TCLP
P104	Silver cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Silver	7440-22-4	0.43	0.14 mg/l TCLP
P105	Sodium azide	Sodium azide	26628-22-8	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P106	Sodium cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
P108	Strychnine and salts	Strychnine and salts	57-24-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P109	Tetraethyldithiopyrophosphate	Tetraethyldithiopyrophosphate	3689-24-5	CARBN; or CMBST	CMBST
P110	Tetraethyl lead	Lead	7439-92-1	0.69	0.75 mg/l TCLP
P111	Tetraethylpyrophosphate	Tetraethylpyrophosphate	107-49-3	CARBN; or CMBST	CMBST
P112	Tetranitromethane	Tetranitromethane	509-14-8	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
P113	Thallic oxide	Thallium (measured in wastewaters only)	7440-28-0	1.4	RTHRM; or STABL
P114	Thallium selenite	Selenium	7782-49-2	0.82	5.7 mg/l TCLP
P115	Thallium (I) sulfate	Thallium (measured in wastewaters only)	7440-28-0	1.4	RTHRM; or STABL
P116	Thiosemicarbazide	Thiosemicarbazide	79-19-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P118	Trichloromethanethiol	Trichloromethanethiol	75-70-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
P119	Ammonium vanadate	Vanadium (measured in wastewaters only)	7440-62-2	4.3	STABL
P120	Vanadium pentoxide	Vanadium (measured in wastewaters only)	7440-62-2	4.3	STABL
P121	Zinc cyanide	Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P122	Zinc phosphide Zn_3P_2, when present at concentrations greater than 10%	Zinc Phosphide	1314-84-7	CHOXD; CHRED; or CMBST	CHOXD; CHRED; or CMBST
P123	Toxaphene	Toxaphene	8001-35-2	0.0095	2.6
P127	Carbofuran [10]	Carbofuran	1563-66-2	0.006	0.14
P128	Mexacarbate [10]	Mexacarbate	315-18-4	0.056	1.4
P185	Tirpate [10]	Tirpate	26419-73-8	0.056	0.28
P188	Physostigmine salicylate [10]	Physostigmine salicylate	57-64-7	0.056	1.4
P189	Carbosulfan [10]	Carbosulfan	55285-14-8	0.028	1.4
P190	Metolcarb [10]	Metolcarb	1129-41-5	0.056	1.4
P191	Dimetilan [10]	Dimetilan	644-64-4	0.056	1.4
P192	Isolan [10]	Isolan	119-38-0	0.056	1.4
P194	Oxamyl [10]	Oxamyl	23135-22-0	0.056	0.28
P196	Manganese dimethyldithiocarbamate [10]	Dithiocarbamates (total)	NA	0.028	28
P197	Formparanate [10]	Formparanate	17702-57-7	0.056	1.4
P198	Formetanate hydrochloride [10]	Formetanate hydrochloride	23422-53-9	0.056	1.4
P199	Methiocarb [10]	Methiocarb	2032-65-7	0.056	1.4
P201	Promecarb [10]	Promecarb	2631-37-0	0.056	1.4
P202	m-Cumenyl methylcarbamate [10]	m-Cumenyl methylcarbamate	64-00-6	0.056	1.4

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
P203	Aldicarb sulfone [10]	Aldicarb sulfone	1646-88-4	0.056	0.28
P204	Physostigmine [10]	Physostigmine	57-47-6	0.056	1.4
P205	Ziram [10]	Dithiocarbamates (total)	NA	0.028	28
U001	Acetaldehyde	Acetaldehyde	75-07-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U002	Acetone	Acetone	67-64-1	0.28	160
U003	Acetonitrile	Acetonitrile	75-05-8	5.6	CMBST
		Acetonitrile; alternate[6] standard for nonwastewaters only	75-05-8	NA	38
U004	Acetophenone	Acetophenone	98-86-2	0.010	9.7
U005	2-Acetylaminofluorene	2-Acetylaminofluorene	53-96-3	0.059	140
U006	Acetyl chloride	Acetyl Chloride	75-36-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U007	Acrylamide	Acrylamide	79-06-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U008	Acrylic acid	Acrylic acid	79-10-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U009	Acrylonitrile	Acrylonitrile	107-13-1	0.24	84
U010	Mitomycin C	Mitomycin C	50-07-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U011	Amitrole	Amitrole	61-82-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U012	Aniline	Aniline	62-53-3	0.81	14

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U014	Auramine	Auramine	492-80-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U015	Azaserine	Azaserine	115-02-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U016	Benz(c)acridine	Benz(c)acridine	225-51-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U017	Benzal chloride	Benzal chloride	98-87-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U018	Benz(a)anthracene	Benz(a)anthracene	56-55-3	0.059	3.4
U019	Benzene	Benzene	71-43-2	0.14	10
U020	Benzenesulfonyl chloride	Benzenesulfonyl chloride	98-09-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U021	Benzidine	Benzidine	92-87-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U022	Benzo(a)pyrene	Benzo(a)pyrene	50-32-8	0.061	3.4
U023	Benzotrichloride	Benzotrichloride	98-07-7	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U024	bis(2-Chloroethoxy)methane	bis(2-Chloroethoxy)methane	111-91-1	0.036	7.2
U025	bis(2-Chloroethyl)ether	bis(2-Chloroethyl)ether	111-44-4	0.033	6.0
U026	Chlornaphazine	Chlornaphazine	494-03-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U027	bis(2-Chloroisopropyl)ether	bis(2-Chloroisopropyl)ether	39638-32-9	0.055	7.2
U028	bis(2-Ethylhexyl) phthalate	bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U029	Methyl bromide (Bromomethane)	Methyl bromide (Bromomethane)	74-83-9	0.11	15
U030	4-Bromophenyl phenyl ether	4-Bromophenyl phenyl ether	101-55-3	0.055	15
U031	n-Butyl alcohol	n-Butyl alcohol	71-36-3	5.6	2.6
U032	Calcium chromate	Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
U033	Carbon oxyfluoride	Carbon oxyfluoride	353-50-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U034	Trichloroacetaldehyde (Chloral)	Trichloroacetaldehyde (Chloral)	75-87-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U035	Chlorambucil	Chlorambucil	305-03-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U036	Chlordane	Chlordane (alpha and gamma isomers)	57-74-9	0.0033	0.26
U037	Chlorobenzene	Chlorobenzene	108-90-7	0.057	6.0
U038	Chlorobenzilate	Chlorobenzilate	510-15-6	0.10	CMBST
U039	p-Chloro-m-cresol	p-Chloro-m-cresol	59-50-7	0.018	14
U041	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	106-89-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U042	2-Chloroethyl vinyl ether	2-Chloroethyl vinyl ether	110-75-8	0.062	CMBST
U043	Vinyl chloride	Vinyl chloride	75-01-4	0.27	6.0
U044	Chloroform	Chloroform	67-66-3	0.046	6.0
U045	Chloromethane (Methyl chloride)	Chloromethane (Methyl chloride)	74-87-3	0.19	30
U046	Chloromethyl methyl ether	Chloromethyl methyl ether	107-30-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U047	2-Chloronaphthalene	2-Chloronaphthalene	91-58-7	0.055	5.6
U048	2-Chlorophenol	2-Chlorophenol	95-57-8	0.044	5.7
U049	4-Chloro-o-toluidine hydrochloride	4-Chloro-o-toluidine hydrochloride	3165-93-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U050	Chrysene	Chrysene	218-01-9	0.059	3.4
U051	Creosote	Naphthalene	91-20-3	0.059	5.6
		Pentachlorophenol	87-86-5	0.089	7.4
		Phenanthrene	85-01-8	0.059	5.6
		Pyrene	129-00-0	0.067	8.2
		Toluene	108-88-3	0.080	10
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
U052	Cresols (Cresylic acid)	o-Cresol	95-48-7	0.11	5.6
		m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
		p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
		Cresol-mixed isomers (Cresylic acid) (sum of o-, m-, and p-cresol concentrations)	1319-77-3	0.88	11.2

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U053	Crotonaldehyde	Crotonaldehyde	4170-30-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U055	Cumene	Cumene	98-82-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U056	Cyclohexane	Cyclohexane	110-82-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U057	Cyclohexanone	Cyclohexanone	108-94-1	0.36	CMBST
		Cyclohexanone; alternate[6] standard for nonwastewaters only	108-94-1	NA	0.75 mg/l TCLP
U058	Cyclophosphamide	Cyclophosphamide	50-18-0	CARBN; or CMBST	CMBST
U059	Daunomycin	Daunomycin	20830-81-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U060	DDD	o,p'-DDD	53-19-0	0.023	0.087
		p,p'-DDD	72-54-8	0.023	0.087
U061	DDT	o-p'-DDT	789-02-6	0.0039	0.087
		p,p'-DDT	50-29-3	0.0039	0.087
		o,p'-DDD	53-19-0	0.023	0.087
		p,p'-DDD	72-54-8	0.023	0.087
		o,p'-DDE	3424-82-6	0.031	0.087
		p,p'-DDE	72-55-9	0.031	0.087
U062	Diallate	Diallate	2303-16-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U063	Dibenz(a,h)anthracene	Dibenz(a,h)anthracene	53-70-3	0.055	8.2

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U064	Dibenz(a,i)pyrene	Dibenz(a,i)pyrene	189-55-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U066	1,2-Dibromo-3-chloropropane	1,2-Dibromo-3-chloropropane	96-12-8	0.11	15
U067	Ethylene dibromide (1,2-Dibromoethane)	Ethylene dibromide (1,2-Dibromoethane)	106-93-4	0.028	15
U068	Dibromomethane	Dibromomethane	74-95-3	0.11	15
U069	Di-n-butyl phthalate	Di-n-butyl phthalate	84-74-2	0.057	28
U070	o-Dichlorobenzene	o-Dichlorobenzene	95-50-1	0.088	6.0
U071	m-Dichlorobenzene	m-Dichlorobenzene	541-73-1	0.036	6.0
U072	p-Dichlorobenzene	p-Dichlorobenzene	106-46-7	0.090	6.0
U073	3,3'-Dichlorobenzidine	3,3'-Dichlorobenzidine	91-94-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U074	1,4-Dichloro-2-butene	cis-1,4-Dichloro-2-butene	1476-11-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
		trans-1,4-Dichloro-2-butene	764-41-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U075	Dichlorodifluoromethane	Dichlorodifluoromethane	75-71-8	0.23	7.2
U076	1,1-Dichloroethane	1,1-Dichloroethane	75-34-3	0.059	6.0
U077	1,2-Dichloroethane	1,2-Dichloroethane	107-06-2	0.21	6.0
U078	1,1-Dichloroethylene	1,1-Dichloroethylene	75-35-4	0.025	6.0
U079	1,2-Dichloroethylene	trans-1,2-Dichloroethylene	156-60-5	0.054	30
U080	Methylene chloride	Methylene chloride	75-09-2	0.089	30
U081	2,4-Dichlorophenol	2,4-Dichlorophenol	120-83-2	0.044	14

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U082	2,6-Dichlorophenol	2,6-Dichlorophenol	87-65-0	0.044	14
U083	1,2-Dichloropropane	1,2-Dichloropropane	78-87-5	0.85	18
U084	1,3-Dichloropropylene	cis-1,3-Dichloropropylene	10061-01-5	0.036	18
		trans-1,3-Dichloropropylene	10061-02-6	0.036	18
U085	1,2:3,4-Diepoxybutane	1,2:3,4-Diepoxybutane	1464-53-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U086	N,N'-Diethylhydrazine	N,N'-Diethylhydrazine	1615-80-1	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U087	O,O-Diethyl S-methyldithiophosphate	O,O-Diethyl S-methyldithiophosphate	3288-58-2	CARBN; or CMBST	CMBST
U088	Diethyl phthalate	Diethyl phthalate	84-66-2	0.20	28
U089	Diethyl stilbestrol	Diethyl stilbestrol	56-53-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U090	Dihydrosafrole	Dihydrosafrole	94-58-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U091	3,3'-Dimethoxybenzidine	3,3'-Dimethoxybenzidine	119-90-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U092	Dimethylamine	Dimethylamine	124-40-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U093	p-Dimethylaminoazobenzene	p-Dimethylaminoazobenzene	60-11-7	0.13	CMBST
U094	7,12-Dimethylbenz(a)anthracene	7,12-Dimethylbenz(a)anthracene	57-97-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U095	3,3'-Dimethylbenzidine	3,3'-Dimethylbenzidine	119-93-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U096	alpha, alpha-Dimethyl benzyl hydroperoxide	alpha, alpha-Dimethyl benzyl hydroperoxide	80-15-9	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U097	Dimethylcarbamoyl chloride	Dimethylcarbamoyl chloride	79-44-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U098	1,1-Dimethylhydrazine	1,1-Dimethylhydrazine	57-14-7	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U099	1,2-Dimethylhydrazine	1,2-Dimethylhydrazine	540-73-8	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U101	2,4-Dimethylphenol	2,4-Dimethylphenol	105-67-9	0.036	14
U102	Dimethyl phthalate	Dimethyl phthalate	131-11-3	0.047	28
U103	Dimethyl sulfate	Dimethyl sulfate	77-78-1	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U105	2,4-Dinitrotoluene	2,4-Dinitrotoluene	121-14-2	0.32	140
U106	2,6-Dinitrotoluene	2,6-Dinitrotoluene	606-20-2	0.55	28
U107	Di-n-octyl phthalate	Di-n-octyl phthalate	117-84-0	0.017	28
U108	1,4-Dioxane	1,4-Dioxane	123-91-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
		1,4-Dioxane; alternate[6]	123-91-1	12.0	170
U109	1,2-Diphenylhydrazine	1,2-Diphenylhydrazine	122-66-7	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		1,2-Diphenylhydrazine; alternate[6] standard for wastewaters only	122-66-7	0.087	NA
U110	Dipropylamine	Dipropylamine	142-84-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U111	Di-n-propylnitrosamine	Di-n-propylnitrosamine	621-64-7	0.40	14
U112	Ethyl acetate	Ethyl acetate	141-78-6	0.34	33
U113	Ethyl acrylate	Ethyl acrylate	140-88-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U114	Ethylenebisdithiocarbamic acid salts and esters	Ethylenebisdithiocarbamic acid	111-54-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U115	Ethylene oxide	Ethylene oxide	75-21-8	(WETOX or CHOXD) fb CARBN; or CMBST	CHOXD; or CMBST
		Ethylene oxide; alternate[6] standard for wastewaters only	75-21-8	0.12	NA
U116	Ethylene thiourea	Ethylene thiourea	96-45-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U117	Ethyl ether	Ethyl ether	60-29-7	0.12	160
U118	Ethyl methacrylate	Ethyl methacrylate	97-63-2	0.14	160
U119	Ethyl methane sulfonate	Ethyl methane sulfonate	62-50-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U120	Fluoranthene	Fluoranthene	206-44-0	0.068	3.4
U121	Trichloromonofluoromethane	Trichloromonofluoromethane	75-69-4	0.020	30
U122	Formaldehyde	Formaldehyde	50-00-0	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U123	Formic acid	Formic acid	64-18-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U124	Furan	Furan	110-00-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U125	Furfural	Furfural	98-01-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U126	Glycidylaldehyde	Glycidylaldehyde	765-34-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U127	Hexachlorobenzene	Hexachlorobenzene	118-74-1	0.055	10
U128	Hexachlorobutadiene	Hexachlorobutadiene	87-68-3	0.055	5.6
U129	Lindane	alpha-BHC	319-84-6	0.00014	0.066
		beta-BHC	319-85-7	0.00014	0.066
		delta-BHC	319-86-8	0.023	0.066
		gamma-BHC (Lindane)	58-89-9	0.0017	0.066
U130	Hexachlorocyclopentadiene	Hexachlorocyclopentadiene	77-47-4	0.057	2.4
U131	Hexachloroethane	Hexachloroethane	67-72-1	0.055	30
U132	Hexachlorophene	Hexachlorophene	70-30-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U133	Hydrazine	Hydrazine	302-01-2	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U134	Hydrogen fluoride	Fluoride (measured in wastewaters only)	16964-48-8	35	ADGAS fb NEUTR; or NEUTR
U135	Hydrogen Sulfide	Hydrogen Sulfide	7783-06-4	CHOXD; CHRED, or CMBST	CHOXD; CHRED; or CMBST.

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U136	Cacodylic acid	Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
U137	Indeno(1,2,3-c,d)pyrene	Indeno(1,2,3-c,d)pyrene	193-39-5	0.0055	3.4
U138	Iodomethane	Iodomethane	74-88-4	0.19	65
U140	Isobutyl alcohol	Isobutyl alcohol	78-83-1	5.6	170
U141	Isosafrole	Isosafrole	120-58-1	0.081	2.6
U142	Kepone	Kepone	143-50-8	0.0011	0.13
U143	Lasiocarpine	Lasiocarpine	303-34-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U144	Lead acetate	Lead	7439-92-1	0.69	0.75 mg/l TCLP
U145	Lead phosphate	Lead	7439-92-1	0.69	0.75 mg/l TCLP
U146	Lead subacetate	Lead	7439-92-1	0.69	0.75 mg/l TCLP
U147	Maleic anhydride	Maleic anhydride	108-31-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U148	Maleic hydrazide	Maleic hydrazide	123-33-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U149	Malononitrile	Malononitrile	109-77-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U150	Melphalan	Melphalan	148-82-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U151	U151 (mercury) nonwastewaters that contain greater than or equal to 260 mg/kg total mercury.	Mercury	7439-97-6	NA	RMERC
	U151 (mercury) nonwastewaters that contain less than 260 mg/kg total mercury and that are residues from RMERC only.	Mercury	7439-97-6	NA	0.20 mg/l TCLP

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	U151 (mercury) nonwastewaters that contain less than 260 mg/kg total mercury and that are not residues from RMERC.	Mercury	7439-97-6	NA	0.025 mg/l TCLP
	All U151 (mercury) wastewaters.	Mercury	7439-97-6	0.15	NA
	Elemental Mercury Contaminated with Radioactive Materials	Mercury	7439-97-6	NA	AMLGM
U152	Methacrylonitrile	Methacrylonitrile	126-98-7	0.24	84
U153	Methanethiol	Methanethiol	74-93-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U154	Methanol	Methanol	67-56-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
		Methanol; alternate[6] set of standards for both wastewaters and nonwastewaters	67-56-1	5.6	0.75 mg/l TCLP
U155	Methapyrilene	Methapyrilene	91-80-5	0.081	1.5
U156	Methyl chlorocarbonate	Methyl chlorocarbonate	79-22-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U157	3-Methylcholanthrene	3-Methylcholanthrene	56-49-5	0.0055	15
U158	4,4'-Methylene bis(2-chloroaniline)	4,4'-Methylene bis(2-chloroaniline)	101-14-4	0.50	30
U159	Methyl ethyl ketone	Methyl ethyl ketone	78-93-3	0.28	36
U160	Methyl ethyl ketone peroxide	Methyl ethyl ketone peroxide	1338-23-4	CHOXD; CHRED; CARBN; BIODG; or CMBST	CHOXD; CHRED; or CMBST
U161	Methyl isobutyl ketone	Methyl isobutyl ketone	108-10-1	0.14	33
U162	Methyl methacrylate	Methyl methacrylate	80-62-6	0.14	160

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U163	N-Methyl N'-nitro N-nitrosoguanidine	N-Methyl N'-nitro N-nitrosoguanidine	70-25-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U164	Methylthiouracil	Methylthiouracil	56-04-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U165	Naphthalene	Naphthalene	91-20-3	0.059	5.6
U166	1,4-Naphthoquinone	1,4-Naphthoquinone	130-15-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U167	1-Naphthylamine	1-Naphthylamine	134-32-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U168	2-Naphthylamine	2-Naphthylamine	91-59-8	0.52	CMBST
U169	Nitrobenzene	Nitrobenzene	98-95-3	0.068	14
U170	p-Nitrophenol	p-Nitrophenol	100-02-7	0.12	29
U171	2-Nitropropane	2-Nitropropane	79-46-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U172	N-Nitrosodi-n-butylamine	N-Nitrosodi-n-butylamine	924-16-3	0.40	17
U173	N-Nitrosodiethanolamine	N-Nitrosodiethanolamine	1116-54-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U174	N-Nitrosodiethylamine	N-Nitrosodiethylamine	55-18-5	0.40	28
U176	N-Nitroso-N-ethylurea	N-Nitroso-N-ethylurea	759-73-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U177	N-Nitroso-N-methylurea	N-Nitroso-N-methylurea	684-93-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U178	N-Nitroso-N-methylurethane	N-Nitroso-N-methylurethane	615-53-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U179	N-Nitrosopiperidine	N-Nitrosopiperidine	100-75-4	0.013	35

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U180	N-Nitrosopyrrolidine	N-Nitrosopyrrolidine	930-55-2	0.013	35
U181	5-Nitro-o-toluidine	5-Nitro-o-toluidine	99-55-8	0.32	28
U182	Paraldehyde	Paraldehyde	123-63-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U183	Pentachlorobenzene	Pentachlorobenzene	608-93-5	0.055	10
U184	Pentachloroethane	Pentachloroethane	76-01-7	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
		Pentachloroethane; alternate[6] standards for both wastewaters and nonwastewaters	76-01-7	0.055	6.0
U185	Pentachloronitrobenzene	Pentachloronitrobenzene	82-68-8	0.055	4.8
U186	1,3-Pentadiene	1,3-Pentadiene	504-60-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U187	Phenacetin	Phenacetin	62-44-2	0.081	16
U188	Phenol	Phenol	108-95-2	0.039	6.2
U189	Phosphorus sulfide	Phosphorus sulfide	1314-80-3	CHOXD; CHRED; or CMBST	CHOXD; CHRED; or CMBST
U190	Phthalic anhydride (measured as Phthalic acid or Terephthalic acid	Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	100-21-0	0.055	28
		Phthalic anhydride (measured as Phthalic acid or Terephthalic acid)	85-44-9	0.055	28
U191	2-Picoline	2-Picoline	109-06-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U192	Pronamide	Pronamide	23950-58-5	0.093	1.5
U193	1,3-Propane sultone	1,3-Propane sultone	1120-71-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U194	n-Propylamine	n-Propylamine	107-10-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U196	Pyridine	Pyridine	110-86-1	0.014	16
U197	p-Benzoquinone	p-Benzoquinone	106-51-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U200	Reserpine	Reserpine	50-55-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U201	Resorcinol	Resorcinol	108-46-3	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U202	Saccharin and salts	Saccharin	81-07-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U203	Safrole	Safrole	94-59-7	0.081	22
U204	Selenium dioxide	Selenium	7782-49-2	0.82	5.7 mg/l TCLP
U205	Selenium sulfide	Selenium	7782-49-2	0.82	5.7 mg/l TCLP
U206	Streptozotocin	Streptozotocin	18883-66-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U207	1,2,4,5-Tetrachlorobenzene	1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
U208	1,1,1,2-Tetrachloroethane	1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
U209	1,1,2,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	79-34-5	0.057	6.0
U210	Tetrachloroethylene	Tetrachloroethylene	127-18-4	0.056	6.0
U211	Carbon tetrachloride	Carbon tetrachloride	56-23-5	0.057	6.0

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U213	Tetrahydrofuran	Tetrahydrofuran	109-99-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U214	Thallium (I) acetate	Thallium (measured in wastewaters only)	7440-28-0	1.4	RTHRM; or STABL
U215	Thallium (I) carbonate	Thallium (measured in wastewaters only)	7440-28-0	1.4	RTHRM; or STABL
U216	Thallium (I) chloride	Thallium (measured in wastewaters only)	7440-28-0	1.4	RTHRM; or STABL
U217	Thallium (I) nitrate	Thallium (measured in wastewaters only)	7440-28-0	1.4	RTHRM; or STABL
U218	Thioacetamide	Thioacetamide	62-55-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U219	Thiourea	Thiourea	62-56-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U220	Toluene	Toluene	108-88-3	0.080	10
U221	Toluenediamine	Toluenediamine	25376-45-8	CARBN; or CMBST	CMBST
U222	o-Toluidine hydrochloride	o-Toluidine hydrochloride	636-21-5	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U223	Toluene diisocyanate	Toluene diisocyanate	26471-62-5	CARBN; or CMBST	CMBST
U225	Bromoform (Tribromomethane)	Bromoform (Tribromomethane)	75-25-2	0.63	15
U226	1,1,1-Trichloroethane	1,1,1-Trichloroethane	71-55-6	0.054	6.0
U227	1,1,2-Trichloroethane	1,1,2-Trichloroethane	79-00-5	0.054	6.0
U228	Trichloroethylene	Trichloroethylene	79-01-6	0.054	6.0

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U234	1,3,5-Trinitrobenzene	1,3,5-Trinitrobenzene	99-35-4	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U235	tris-(2,3-Dibromopropyl)-phosphate	tris-(2,3-Dibromopropyl)-phosphate	126-72-7	0.11	0.10
U236	Trypan Blue	Trypan Blue	72-57-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U237	Uracil mustard	Uracil mustard	66-75-1	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U238	Urethane (Ethyl carbamate)	Urethane (Ethyl carbamate)	51-79-6	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U239	Xylenes	Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
U240	2,4-D (2,4-Dichlorophenoxyacetic acid)	2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	0.72	10
	2,4-D (2,4-Dichlorophenoxyacetic acid) salts and esters		NA	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U243	Hexachloropropylene	Hexachloropropylene	1888-71-7	0.035	30
U244	Thiram	Thiram	137-26-8	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U246	Cyanogen bromide	Cyanogen bromide	506-68-3	CHOXD; WETOX; or CMBST	CHOXD; WETOX; or CMBST
U247	Methoxychlor	Methoxychlor	72-43-5	0.25	0.18
U248	Warfarin, & salts, when present at concentrations of 0.3% or less	Warfarin	81-81-2	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
U249	Zinc phosphide, Zn_3P_2, when present at concentrations of 10% or less	Zinc Phosphide	1314-84-7	CHOXD; CHRED; or CMBST	CHOXD; CHRED; or CMBST

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U271	Benomyl [10]	Benomyl	17804-35-2	0.056	1.4
U278	Bendiocarb [10]	Bendiocarb	22781-23-3	0.056	1.4
U279	Carbaryl [10]	Carbaryl	63-25-2	0.006	0.14
U280	Barban [10]	Barban	101-27-9	0.056	1.4
U328	o-Toluidine	o-Toluidine	95-53-4	CMBST; or CHOXD fb (BIODG or CARBN); or BIODG fb CARBN.	CMBST
U353	p-Toluidine	p-Toluidine	106-49-0	CMBST; or CHOXD fb (BIODG or CARBN); or BIODG fb CARBN	CMBST
U359	2-Ethoxyethanol	2-Ethoxyethanol	110-80-5	CMBST; or CHOXD fb (BIODG or CARBN); or BIODG fb CARBN	CMBST
U364	Bendiocarb phenol [10]	Bendiocarb phenol	22961-82-6	0.056	1.4
U367	Carbofuran phenol [10]	Carbofuran phenol	1563-38-8	0.056	1.4
U372	Carbendazim [10]	Carbendazim	10605-21-7	0.056	1.4
U373	Propham [10]	Propham	122-42-9	0.056	1.4
U387	Prosulfocarb [10]	Prosulfocarb	52888-80-9	0.042	1.4
U389	Triallate [10]	Triallate	2303-17-5	0.042	1.4
U394	A2213 [10]	A2213	30558-43-1	0.042	1.4

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
U395	Diethylene glycol, dicarbamate [10]	Diethylene glycol, dicarbamate	5952-26-1	0.056	1.4
U404	Triethylamine [10]	Triethylamine	101-44-8	0.081	1.5
U408	2,4,6-Tribromophenol	2,4,6-Tribromophenol	111-79-6	0.035	7.4
U409	Thiophanate-methyl [10]	Thiophanate-methyl	23564-05-8	0.056	1.4
U410	Thiodicarb [10]	Thiodicarb	59669-26-0	0.019	1.4
U411	Propoxur [10]	Propoxur	114-26-1	0.056	1.4

Footnotes to Treatment Standard Table 268.40

[1] The waste descriptions provided in this table do not replace waste descriptions in 40 CFR 261. Descriptions of Treatment/Regulatory Subcategories are provided, as needed, to distinguish between applicability of different standards.

[2] CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with its salts and/or esters, the CAS number is given for the parent compound only.

[3] Concentration standards for wastewaters are expressed in mg/l and are based on analysis of composite samples.

[4] All treatment standards expressed as a Technology Code or combination of Technology Codes are explained in detail in 40 CFR 268.42 Table 1—Technology Codes and Descriptions of Technology-Based Standards.

[5] Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR Part 264 Subpart O or Part 265 Subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

[6] Where an alternate treatment standard or set of alternate standards has been indicated, a facility may comply with this alternate standard, but only for the Treatment/Regulatory Subcategory or physical form (i.e., wastewater and/or nonwastewater) specified for that alternate standard.

[7] Both Cyanides (Total) and Cyanides (Amenable) for nonwastewaters are to be analyzed using Method 9010 or 9012, found in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication SW–846, as incorporated by reference in 40 CFR 260.11, with a sample size of 10 grams and a distillation time of one hour and 15 minutes.

[8] These wastes, when rendered nonhazardous and then subsequently managed in CWA, or CWA-equivalent systems, are not subject to treatment standards. (See § 268.1(c) (3) and (4)).

[9] These wastes, when rendered nonhazardous and then subsequently injected in a Class I SDWA well, are not subject to treatment standards. (See § 148.1(d)).

[10] Between August 26, 1996, and August 26, 1997, the treatment standard for this waste may be satisfied by either meeting the constituent concentrations in this table or by treating the waste by the specified technologies: combustion, as defined by the technology code CMBST at § 268.42 Table 1 of this Part, for nonwastewaters; and, biodegradation as definded by the technology code BIODG, carbon adsorption as defined by the technology code CARBN, chemical oxidation as defined by the technology code CHOXD, or combustion as defined as technology code CMBST at § 268.42 Table 1 of this Part, for wastewaters.

[11] For these wastes, the definition of CMBST is limited to: (1) combustion units operating under 40 CFR 266, (2) combustion units permitted under 40 CFR Part 264, Subpart O, or (3) combustion units operating under 40 CFR 265, Subpart O, which have obtained a determination of equivalent treatment under 268.42 (b).

14. Section 268.42 is amended by revising the introductory text of paragraph (a) and removing paragraphs (a)(1), (a)(2), and (a)(3) to read as follows:

§ 268.42 Treatment standards expressed as specified technologies.

(a) The following wastes in the table in § 268.40 ''Treatment Standards for Hazardous Wastes,'' for which standards are expressed as a treatment method rather than a concentration level, must be treated using the technology or technologies specified in the table entitled ''Technology Codes and Description of Technology-Based Standards'' in this section.

* * * * *

15. Section 268.44 is amended by redesignating paragraph (h)(3) as (h)(5), and adding new paragraphs (h) (3) and (4) to read as follows:

§ 268.44 Variance from a treatment standard.

* * * * *

(h) * * *

(3) For contaminated soil only, treatment to the level or by the method specified in the soil treatment standards would result in concentrations of hazardous constituents that are below (i.e., lower than) the concentrations necessary to minimize short- and long-term threats to human health and the environment. Treatment variances approved under this paragraph must:

(i) At a minimum, impose alternative land disposal restriction treatment standards that, using a reasonable maximum exposure scenario:

(A) For carcinogens, achieve constituent concentrations that result in the total excess risk to an individual exposed over a lifetime generally falling within a range from 10^{-4} to 10^{-6}; and

(B) For constituents with non-carcinogenic effects, achieve constituent concentrations that an individual could be exposed to on a daily basis without appreciable risk of deleterious effect during a lifetime.

(ii) Not consider post-land-disposal controls.

(4) For contaminated soil only, treatment to the level or by the method specified in the soil treatment standards would result in concentrations of hazardous constituents that are below (i.e., lower than) natural background concentrations at the site where the contaminated soil will land disposed.

* * * * *

16. Section 268.45 is amended by revising the introductory text of paragraph (a), and paragraphs (d)(3) and (d)(4) to read as follows:

§ 268.45 Treatment standards for hazardous debris.

(a) Treatment standards. Hazardous debris must be treated prior to land disposal as follows unless EPA determines under § 261.3(f)(2) of this chapter that the debris is no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard provided in this subpart for the waste contaminating the debris:

* * * * *

(d) * * *

(3) Cyanide-reactive debris. Residue from the treatment of debris that is reactive because of cyanide must meet the treatment standards for D003 in ''Treatment Standards for Hazardous Wastes'' at § 268.40.

(4) Ignitable nonwastewater residue. Ignitable nonwastewater residue containing equal to or greater than 10% total organic carbon is subject to the technology specified in the treatment standard for D001: Ignitable Liquids.

* * * * *

17. Section 268.48 is amended by revising the table Universal Treatment Standards to read as follows:

§ 268.48 Universal treatment standards.

(a) * * *

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Organic Constituents			
A2213[6]	30558-43-1	0.042	1.4
Acenaphthylene	208-96-8	0.059	3.4
Acenaphthene	83-32-9	0.059	3.4
Acetone	67-64-1	0.28	160
Acetonitrile	75-05-8	5.6	38
Acetophenone	96-86-2	0.010	9.7
2-Acetylaminofluorene	53-96-3	0.059	140
Acrolein	107-02-8	0.29	NA
Acrylamide	79-06-1	19	23
Acrylonitrile	107-13-1	0.24	84
Aldicarb sulfone[6]	1646-88-4	0.056	0.28
Aldrin	309-00-2	0.021	0.066
4-Aminobiphenyl	92-67-1	0.13	NA
Aniline	62-53-3	0.81	14
Anthracene	120-12-7	0.059	3.4
Aramite	140-57-8	0.36	NA
alpha-BHC	319-84-6	0.00014	0.066
beta-BHC	319-85-7	0.00014	0.066
delta-BHC	319-86-8	0.023	0.066
gamma-BHC	58-89-9	0.0017	0.066
Barban[6]	101-27-9	0.056	1.4
Bendiocarb[6]	22781-23-3	0.056	1.4
Bendiocarb phenol[6]	22961-82-6	0.056	1.4

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard** Concentration in mg/l[2]	**Nonwastewater Standard** Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Benomyl [6]	17804-35-2	0.056	1.4
Benzene	71-43-2	0.14	10
Benz(a)anthracene	56-55-3	0.059	3.4
Benzal chloride	98-87-3	0.055	6.0
Benzo(b)fluoranthene (difficult to distinguish from benzo(k)fluoranthene)	205-99-2	0.11	6.8
Benzo(k)fluoranthene (difficult to distinguish from benzo(b)fluoranthene)	207-08-9	0.11	6.8
Benzo(g,h,i)perylene	191-24-2	0.0055	1.8
Benzo(a)pyrene	50-32-8	0.061	3.4
Bromodichloromethane	75-27-4	0.35	15
Bromomethane/Methyl bromide	74-83-9	0.11	15
4-Bromophenyl phenyl ether	101-55-3	0.055	15
n-Butyl alcohol	71-36-3	5.6	2.6
Butylate [6]	2008-41-5	0.042	1.4
Butyl benzyl phthalate	85-68-7	0.017	28
2-sec-Butyl-4,6-dinitrophenol/Dinoseb	88-85-7	0.066	2.5
Carbaryl [6]	63-25-2	0.006	0.14
Carbenzadim [6]	10605-21-7	0.056	1.4
Carbofuran [6]	1563-66-2	0.006	0.14
Carbofuran phenol [6]	1563-38-8	0.056	1.4
Carbon disulfide	75-15-0	3.8	4.8 mg/l TCLP
Carbon tetrachloride	56-23-5	0.057	6.0
Carbosulfan [6]	55285-14-8	0.028	1.4
Chlordane (alpha and gamma isomers)	57-74-9	0.0033	0.26
p-Chloroaniline	106-47-8	0.46	16

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard** Concentration in mg/l[2]	**Nonwastewater Standard** Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Chlorobenzene	108-90-7	0.057	6.0
Chlorobenzilate	510-15-6	0.10	NA
2-Chloro-1,3-butadiene	126-99-8	0.057	0.28
Chlorodibromomethane	124-48-1	0.057	15
Chloroethane	75-00-3	0.27	6.0
bis(2-Chloroethoxy)methane	111-91-1	0.036	7.2
bis(2-Chloroethyl)ether	111-44-4	0.033	6.0
Chloroform	67-66-3	0.046	6.0
bis(2-Chloroisopropyl)ether	39638-32-9	0.055	7.2
p-Chloro-m-cresol	59-50-7	0.018	14
2-Chloroethyl vinyl ether	110-75-8	0.062	NA
Chloromethane/Methyl chloride	74-87-3	0.19	30
2-Chloronaphthalene	91-58-7	0.055	5.6
2-Chlorophenol	95-57-8	0.044	5.7
3-Chloropropylene	107-05-1	0.036	30
Chrysene	218-01-9	0.059	3.4
o-Cresol	95-48-7	0.11	5.6
m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
m-Cumenyl methylcarbamate [6]	64-00-6	0.056	1.4
Cyclohexanone	108-94-1	0.36	0.75 mg/l TCLP
o,p'-DDD	53-19-0	0.023	0.087
p,p'-DDD	72-54-8	0.023	0.087
o,p'-DDE	3424-82-6	0.031	0.087
p,p'-DDE	72-55-9	0.031	0.087

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
o,p'-DDT	789-02-6	0.0039	0.087
p,p'-DDT	50-29-3	0.0039	0.087
Dibenz(a,h)anthracene	53-70-3	0.055	8.2
Dibenz(a,e)pyrene	192-65-4	0.061	NA
1,2-Dibromo-3-chloropropane	96-12-8	0.11	15
1,2-Dibromoethane/Ethylene dibromide	106-93-4	0.028	15
Dibromomethane	74-95-3	0.11	15
m-Dichlorobenzene	541-73-1	0.036	6.0
o-Dichlorobenzene	95-50-1	0.088	6.0
p-Dichlorobenzene	106-46-7	0.090	6.0
Dichlorodifluoromethane	75-71-8	0.23	7.2
1,1-Dichloroethane	75-34-3	0.059	6.0
1,2-Dichloroethane	107-06-2	0.21	6.0
1,1-Dichloroethylene	75-35-4	0.025	6.0
trans-1,2-Dichloroethylene	156-60-5	0.054	30
2,4-Dichlorophenol	120-83-2	0.044	14
2,6-Dichlorophenol	87-65-0	0.044	14
2,4-Dichlorophenoxyacetic acid/2,4-D	94-75-7	0.72	10
1,2-Dichloropropane	78-87-5	0.85	18
cis-1,3-Dichloropropylene	10061-01-5	0.036	18
trans-1,3-Dichloropropylene	10061-02-6	0.036	18
Dieldrin	60-57-1	0.017	0.13
Diethylene glycol, dicarbamate [6]	5952-26-1	0.056	1.4
Diethyl phthalate	84-66-2	0.20	28
p-Dimethylaminoazobenzene	60-11-7	0.13	NA

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
2-4-Dimethyl phenol	105-67-9	0.036	14
Dimethyl phthalate	131-11-3	0.047	28
Dimetilan [6]	644-64-4	0.056	1.4
Di-n-butyl phthalate	84-74-2	0.057	28
1,4-Dinitrobenzene	100-25-4	0.32	2.3
4,6-Dinitro-o-cresol	534-52-1	0.28	160
2,4-Dinitrophenol	51-28-5	0.12	160
2,4-Dinitrotoluene	121-14-2	0.32	140
2,6-Dinitrotoluene	606-20-2	0.55	28
Di-n-octyl phthalate	117-84-0	0.017	28
Di-n-propylnitrosamine	621-64-7	0.40	14
1,4-Dioxane	123-91-1	12.0	170
Diphenylamine (difficult to distinguish from diphenylnitrosamine)	122-39-4	0.92	13
Diphenylnitrosamine (difficult to distinguish from diphenylamine)	86-30-6	0.92	13
1,2-Diphenylhydrazine	122-66-7	0.087	NA
Disulfoton	298-04-4	0.017	6.2
Dithiocarbamates (total) [6]	NA	0.028	28
Endosulfan I	959-98-8	0.023	0.066
Endosulfan II	33213-65-9	0.029	0.13
Endosulfan sulfate	1031-07-8	0.029	0.13
Endrin	72-20-8	0.0028	0.13
Endrin aldehyde	7421-93-4	0.025	0.13
EPTC [6]	759-94-4	0.042	1.4
Ethyl acetate	141-78-6	0.34	33

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard** Concentration in mg/l[2]	**Nonwastewater Standard** Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Ethyl benzene	100-41-4	0.057	10
Ethyl cyanide/Propanenitrile	107-12-0	0.24	360
Ethyl ether	60-29-7	0.12	160
bis(2-Ethylhexyl) phthalate	117-81-7	0.28	28
Ethyl methacrylate	97-63-2	0.14	160
Ethylene oxide	75-21-8	0.12	NA
Famphur	52-85-7	0.017	15
Fluoranthene	206-44-0	0.068	3.4
Fluorene	86-73-7	0.059	3.4
Formetanate hydrochloride [6]	23422-53-9	0.056	1.4
Formparanate [6]	17702-57-7	0.056	1.4
Heptachlor	76-44-8	0.0012	0.066
Heptachlor epoxide	1024-57-3	0.016	0.066
Hexachlorobenzene	118-74-1	0.055	10
Hexachlorobutadiene	87-68-3	0.055	5.6
Hexachlorocyclopentadiene	77-47-4	0.057	2.4
HxCDDs (All Hexachlorodibenzo-p-dioxins)	NA	0.000063	0.001
HxCDFs (All Hexachlorodibenzofurans)	NA	0.000063	0.001
Hexachloroethane	67-72-1	0.055	30
Hexachloropropylene	1888-71-7	0.035	30
Indeno (1,2,3-c,d) pyrene	193-39-5	0.0055	3.4
Iodomethane	74-88-4	0.19	65
Isobutyl alcohol	78-83-1	5.6	170
Isodrin	465-73-6	0.021	0.066
Isolan [6]	119-38-0	0.056	1.4

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Isosafrole	120-58-1	0.081	2.6
Kepone	143-50-0	0.0011	0.13
Methacrylonitrile	126-98-7	0.24	84
Methanol	67-56-1	5.6	0.75 mg/l TCLP
Methapyrilene	91-80-5	0.081	1.5
Methiocarb [6]	2032-65-7	0.056	1.4
Methomyl [6]	16752-77-5	0.028	0.14
Methoxychlor	72-43-5	0.25	0.18
3-Methylcholanthrene	56-49-5	0.0055	15
4,4-Methylene bis(2-chloroaniline)	101-14-4	0.50	30
Methylene chloride	75-09-2	0.089	30
Methyl ethyl ketone	78-93-3	0.28	36
Methyl isobutyl ketone	108-10-1	0.14	33
Methyl methacrylate	80-62-6	0.14	160
Methyl methansulfonate	66-27-3	0.018	NA
Methyl parathion	298-00-0	0.014	4.6
Metolcarb [6]	1129-41-5	0.056	1.4
Mexacarbate [6]	315-18-4	0.056	1.4
Molinate [6]	2212-67-1	0.042	1.4
Naphthalene	91-20-3	0.059	5.6
2-Naphthylamine	91-59-8	0.52	NA
o-Nitroaniline	88-74-4	0.27	14
p-Nitroaniline	100-01-6	0.028	28
Nitrobenzene	98-95-3	0.068	14
5-Nitro-o-toluidine	99-55-8	0.32	28

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
o-Nitrophenol	88-75-5	0.028	13
p-Nitrophenol	100-02-7	0.12	29
N-Nitrosodiethylamine	55-18-5	0.40	28
N-Nitrosodimethylamine	62-75-9	0.40	2.3
N-Nitroso-di-n-butylamine	924-16-3	0.40	17
N-Nitrosomethylethylamine	10595-95-6	0.40	2.3
N-Nitrosomorpholine	59-89-2	0.40	2.3
N-Nitrosopiperidine	100-75-4	0.013	35
N-Nitrosopyrrolidine	930-55-2	0.013	35
Oxamyl [6]	23135-22-0	0.056	0.28
Parathion	56-38-2	0.014	4.6
Total PCBs (sum of all PCB isomers, or all Aroclors)	1336-36-3	0.10	10
Pebulate [6]	1114-71-2	0.042	1.4
Pentachlorobenzene	608-93-5	0.055	10
PeCDDs (All Pentachlorodibenzo-p-dioxins)	NA	0.000063	0.001
PeCDFs (All Pentachlorodibenzofurans)	NA	0.000035	0.001
Pentachloroethane	76-01-7	0.055	6.0
Pentachloronitrobenzene	82-68-8	0.055	4.8
Pentachlorophenol	87-86-5	0.089	7.4
Phenacetin	62-44-2	0.081	16
Phenanthrene	85-01-8	0.059	5.6
Phenol	108-95-2	0.039	6.2
o-Phenylenediamine [6]	95-54-5	0.056	5.6
Phorate	298-02-2	0.021	4.6
Phthalic acid	100-21-0	0.055	28

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Phthalic anhydride	85-44-9	0.055	28
Physostigmine [6]	57-47-6	0.056	1.4
Physostigmine salicylate [6]	57-64-7	0.056	1.4
Promecarb [6]	2631-37-0	0.056	1.4
Pronamide	23950-58-5	0.093	1.5
Propham [6]	122-42-9	0.056	1.4
Propoxur [6]	114-26-1	0.056	1.4
Prosulfocarb [6]	52888-80-9	0.042	1.4
Pyrene	129-00-0	0.067	8.2
Pyridine	110-86-1	0.014	16
Safrole	94-59-7	0.081	22
Silvex/2,4,5-TP	93-72-1	0.72	7.9
1,2,4,5-Tetrachlorobenzene	95-94-3	0.055	14
TCDDs (All Tetrachlorodibenzo-p-dioxins)	NA	0.000063	0.001
TCDFs (All Tetrachlorodibenzofurans)	NA	0.000063	0.001
1,1,1,2-Tetrachloroethane	630-20-6	0.057	6.0
1,1,2,2-Tetrachloroethane	79-34-5	0.057	6.0
Tetrachloroethylene	127-18-4	0.056	6.0
2,3,4,6-Tetrachlorophenol	58-90-2	0.030	7.4
Thiodicarb [6]	59669-26-0	0.019	1.4
Thiophanate-methyl [6]	23564-05-8	0.056	1.4
Tirpate [6]	26419-73-8	0.056	0.28
Toluene	108-88-3	0.080	10
Toxaphene	8001-35-2	0.0095	2.6
Triallate [6]	2303-17-5	0.042	1.4

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable

REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard** Concentration in mg/l[2]	**Nonwastewater Standard** Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Tribromomethane/Bromoform	75-25-2	0.63	15
2,4,6-Tribromophenol	118-79-6	0.035	7.4
1,2,4-Trichlorobenzene	120-82-1	0.055	19
1,1,1-Trichloroethane	71-55-6	0.054	6.0
1,1,2-Trichloroethane	79-00-5	0.054	6.0
Trichloroethylene	79-01-6	0.054	6.0
Trichloromonofluoromethane	75-69-4	0.020	30
2,4,5-Trichlorophenol	95-95-4	0.18	7.4
2,4,6-Trichlorophenol	88-06-2	0.035	7.4
2,4,5-Trichlorophenoxyacetic acid/2,4,5-T	93-76-5	0.72	7.9
1,2,3-Trichloropropane	96-18-4	0.85	30
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.057	30
Triethylamine [6]	101-44-8	0.081	1.5
tris-(2,3-Dibromopropyl) phosphate	126-72-7	0.11	0.10
Vernolate [6]	1929-77-7	0.042	1.4
Vinyl chloride	75-01-4	0.27	6.0
Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
Inorganic Constituents			
Antimony	7440-36-0	1.9	1.15 mg/l TCLP
Arsenic	7440-38-2	1.4	5.0 mg/l TCLP
Barium	7440-39-3	1.2	21 mg/l TCLP
Beryllium	7440-41-7	0.82	1.22 mg/l TCLP
Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
Cyanides (Total)[4]	57-12-5	1.2	590

UNIVERSAL TREATMENT STANDARDS NOTE: NA means not applicable			
REGULATED CONSTITUENT **Common Name**	**CAS[1] Number**	**Wastewater Standard**	**Nonwastewater Standard**
		Concentration in mg/l[2]	Concentration in mg/kg[3] unless noted as "mg/l TCLP"
Cyanides (Amenable)[4]	57-12-5	0.86	30
Fluoride[5]	16984-48-8	35	NA
Lead	7439-92-1	0.69	0.75 mg/l TCLP
Mercury - Nonwastewater from Retort	7439-97-6	NA	0.20 mg/l TCLP
Mercury - All Others	7439-97-6	0.15	0.025 mg/lTCLP
Nickel	7440-02-0	3.98	11 mg/l TCLP
Selenium[7]	7782-49-2	0.82	5.7 mg/l TCLP
Silver	7440-22-4	0.43	0.14 mg/l TCLP
Sulfide[5]	18496-25-8	14	NA
Thallium	7440-28-0	1.4	0.20 mg/l TCLP
Vanadium[5]	7440-62-2	4.3	1.6 mg/l TCLP
Zinc[5]	7440-66-6	2.61	4.3 mg/l TCLP

FOOTNOTES TO TABLE UTS

1 CAS means Chemical Abstract Services. When the waste code and/or regulated constituents are described as a combination of a chemical with it's salts and/or esters, the CAS number is given for the parent compound only.44

2 Concentration standards for wastewaters are expressed in mg/l and are based on analysis of composite samples.

3 Except for Metals (EP or TCLP) and Cyanides (Total and Amenable) the nonwastewater treatment standards expressed as a concentration were established, in part, based upon incineration in units operated in accordance with the technical requirements of 40 CFR part 264, subpart O or 40 CFR part 265, subpart O, or based upon combustion in fuel substitution units operating in accordance with applicable technical requirements. A facility may comply with these treatment standards according to provisions in 40 CFR 268.40(d). All concentration standards for nonwastewaters are based on analysis of grab samples.

4 Both Cyanides (Total) and Cyanides (Amenable) for nonwastewaters are to be analyzed using Method 9010 or 9012, found in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, as incorporated by reference in 40 CFR 260.11, with a sample size of 10 grams and a distillation time of one hour and 15 minutes.

5 These constituents are not "underlying hazardous constituents" in characteristic wastes, according to the definition at §268.2(i).

6 Between August 26, 1996, and August 26, 1997, these constituents are not "underlying hazardous constituents" as defined at §268.2(i) of this part.

7 This constituent is not an underlying hazardous constituent as defined at §268.2(i) of this part because its UTS level is greater than its TC level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

BILLING CODE 6560–50–C

18. Subpart D is amended by adding § 268.49 to read as follows:

§ 268.49 Alternative LDR treatment standards for contaminated soil.

(a) Applicability. You must comply with LDRs prior to placing soil that exhibits a characteristic of hazardous waste, or exhibited a characteristic of hazardous waste at the time it was generated, into a land disposal unit. The following chart describes whether you must comply with LDRs prior to placing soil contaminated by listed hazardous waste into a land disposal unit:

If LDRs	And if LDRs	And if	Then you
Applied to the listed waste when it contaminated the soil*.	Apply to the listed waste now		Must comply with LDRs
Didn't apply to the listed waste when it contaminated the soil*.	Apply to the listed waste now	The soil is determined to contain the listed waste when the soil is first generated.	Must comply with LDRs.
Didn't apply to the listed waste when it contaminated the soil*.	Apply to the listed waste now	The soil is determined not to contain the listed waste when the soil is first generated.	Needn't comply with LDRs.
Didn't apply to the listed waste when it contaminated the soil*.	Don't apply to the listed waste now		Needn't comply with LDRs.

* For dates of LDR applicability, see 40 CFR Part 268 Appendix VII. To determine the date any given listed hazardous waste contaminated any given volume of soil, use the last date any given listed hazardous waste was placed into any given land disposal unit or, in the case of an accidental spill, the date of the spill.

(b) Prior to land disposal, contaminated soil identified by paragraph (a) of this section as needing to comply with LDRs must be treated according to the applicable treatment standards specified in paragraph (c) of this section or according to the Universal Treatment Standards specified in 40 CFR 268.48 applicable to the contaminating listed hazardous waste and/or the applicable characteristic of hazardous waste if the soil is characteristic. The treatment standards specified in paragraph (c) of this section and the Universal Treatment Standards may be modified through a treatment variance approved in accordance with 40 CFR 268.44.

(c) Treatment standards for contaminated soils. Prior to land disposal, contaminated soil identified by paragraph (a) of this section as needing to comply with LDRs must be treated according to all the standards specified in this paragraph or according to the Universal Treatment Standards specified in 40 CFR 268.48.

(1) All soils. Prior to land disposal, all constituents subject to treatment must be treated as follows:

(A) For non-metals, treatment must achieve 90 percent reduction in total constituent concentrations, except as provided by paragraph (c)(1)(C) of this section.

(B) For metals, treatment must achieve 90 percent reduction in constituent concentrations as measured in leachate from the treated media (tested according to the TCLP) or 90 percent reduction in total constituent concentrations (when a metal removal treatment technology is used), except as provided by paragraph (c)(1)(C) of this section.

(C) When treatment of any constituent subject to treatment to a 90 percent reduction standard would result in a concentration less than 10 times the Universal Treatment Standard for that constituent, treatment to achieve constituent concentrations less than 10 times the universal treatment standard is not required. Universal Treatment Standards are identified in 40 CFR 268.48 Table UTS.

(2) Soils that exhibit the characteristic of ignitability, corrosivity or reactivity. In addition to the treatment required by paragraph (c)(1) of this section, prior to land disposal, soils that exhibit the characteristic of ignitability, corrosivity, or reactivity must be treated to eliminate these characteristics.

(3) Soils that contain nonanalyzable constituents. In addition to the treatment requirements of paragraphs (c)(1) and (2) of this section, prior to land disposal, the following treatment is required for soils that contain nonanalyzable constituents:

(A) For soil that also contains analyzable constituents, treatment of those analyzable constituents to the levels specified in paragraphs (c)(1) and (2) of this section; or,

(B) For soil that contains only nonanalyzable constituents, treatment by the method specified in § 268.42 for the waste contained in the soil.

(d) Constituents subject to treatment. When applying the soil treatment standards in paragraph (c) of this section, constituents subject to treatment are any constituents listed in 40 CFR 268.48, Table UTS—Universal Treatment Standards that are reasonably expected to be present in any given volume of contaminated soil, except fluoride, selenium, sulfides, vanadium and zinc, and are present at concentrations greater than ten times the universal treatment standard.

(e) Management of treatment residuals. Treatment residuals from treating contaminated soil identified by paragraph (a) of this section as needing to comply with LDRs must be managed as follows:

(1) Soil residuals are subject to the treatment standards of this section;

(2) Non-soil residuals are subject to:

(A) For soils contaminated by listed hazardous waste, the RCRA Subtitle C standards applicable to the listed hazardous waste; and

(B) For soils that exhibit a characteristic of hazardous waste, if the non-soil residual also exhibits a characteristic of hazardous waste, the treatment standards applicable to the characteristic hazardous waste.

19. Table 1 in Appendix VII to Part 268 is amended by removing the entries for waste code F033; revising the second entry for waste code F032, the second entry for F034, and the first entry for K088; revising the entries for D003-D011 and two entries for waste code F035; and, Table 2 is amended by revising entry number 9 and adding entries 12 and 13 to read as follows:

TABLE 1.—EFFECTIVE DATES OF SURFACE DISPOSED WASTES

[(Non-soil and Debris) Regulated in the LDRS[a]—Comprehensive List]

Waste code	Waste category	Effective date
*	* * * * *	*
D003	Newly identified surface-disposed elemental phosphorus processing wastes	May 26, 2000.
D004	Newly identified D004 and mineral processing wastes	August 24, 1998.
D004	Mixed radioactive/newly identified D004 or mineral processing wastes	May 26, 2000.
D005	Newly identified D005 and mineral processing wastes	August 24, 1998.
D005	Mixed radioactive/newly identified D005 or mineral processing wastes	May 26, 2000.
D006	Newly identified D006 and mineral processing wastes	August 24, 1998.
D006	Mixed radioactive/newly identified D006 or mineral processing wastes	May 26, 2000.
D007	Newly identified D007 and mineral processing wastes	August 24, 1998.
D007	Mixed radioactive/newly identified D007or mineral processing wastes	May 26, 2000.
D008	Newly identified D008 and mineral processing waste	August 24, 1998.
D008	Mixed radioactive/newly identified D008 or mineral processing wastes	May 26, 2000.
D009	Newly identified D009 and mineral processing waste	August 24, 1998.
D009	Mixed radioactive/newly identified D009or mineral processing wastes	May 26, 2000.
D010	Newly identified D010 and mineral processing wastes	August 24, 1998.
D010	Mixed radioactive/newly identified D010 ormineral processing wastes	May 26, 2000.
D011	Newly identified D011 and mineral processing wastes	August 24, 1998.
D011	Mixed radioactive/newly identified D011or mineral processing wastes	May 26, 2000.
*	* * * * *	*
F032	All others	August 12, 1997.
*	* * * * *	*
F034	All others	August 12, 1997.
F035	Mixed with radioactive wastes	May 12, 1999.
F035	All others	August 12, 1997.
*	* * * * *	*
K088	All others	October 8, 1997.
*	* * * * *	*

* * * * *

TABLE 2.—SUMMARY OF EFFECTIVE DATES OF LAND DISPOSAL RESTRICTIONS FOR CONTAMINATED SOIL AND DEBRIS (CSD)

Restricted hazardous waste in CSD	Effective date
* * * * * *	*
9. Soil and debris contaminated with K088 wastes	October 8, 1997.
* * * * * *	*
12. Soil and debris contaminated with newly identified D004–D011 toxicity characteristic wastes and mineral processing wastes.	August 24, 1998.
13. Soil and debris contaminated with mixed radioactive newly identified D004–D011 characteristic wastes and mineral processing wastes.	May 26, 2000.

20. Appendix VIII to Part 268 is amended by revising the title and adding in alpha numeric order the entry ‘‘NA’’ to read as follows:

Appendix VIII to Part 268—LDR Effective Dates of Injected Prohibited Hazardous Wastes

NATIONAL CAPACITY LDR VARIANCES FOR UIC WASTES

Waste code	Waste category	Effective date
*	* * * * *	*
NA	Newly identified mineral processing wastes from titanium dioxide production and mixed radioactive/newly identified D004–D011 characteristic wastes and mineral processing wastes.	May 26, 2000.
*	* * * * *	*

PART 271—REQUIREMENTS FOR AUTHORIZATION OF STATE HAZARDOUS WASTE PROGRAMS

21. The authority citation for Part 271 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a) and 6926.

Subpart A—Requirements for Final Authorization

22. Section 271.1(j) is amended by adding the following entries to Table 1 in chronological order by date of publication in the **Federal Register**, and by adding the following entries to Table 2 in chronological order by effective date in the **Federal Register**, to read as follows:

§ 271.1 Purpose and scope.

* * * * *

(j) * * *

TABLE 1.—REGULATIONS IMPLEMENTING THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Promulgation date	Title of regulation	Federal Register reference	Effective date
* * *	*	* *	*
May 26, 1998	Land Disposal Restrictions Phase IV Final Rule	[Insert FR page numbers]	August 24, 1998.
* * *	*	* *	*

* * * * *

TABLE 2.—SELF-IMPLEMENTING PROVISIONS OF THE HAZARDOUS AND SOLID WASTE AMENDMENTS OF 1984

Effective date	Self-implementing provision	RCRA citation	Federal Register reference
* *	* *	*	* *
August 24, 1998	Prohibition on land disposal of newly identified wastes including TC metal wastes and characteristic mineral processing wastes; treatment standards for contaminated soil.	3004(m)	Date of publication and FR page cite.
May 26, 2000	Prohibition on land disposal of newly identified wastes from elemental phosphorus processing and mixed radioactive and newly identified TC metal/mineral processing wastes (including soil and debris). Prohibition on underground injection of newly identified mineral processing wastes from titanium dioxide production	3004(m)	Date of publication and FR page cite.
* *	* *	*	* *

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