considered in developing this promulgated rulemaking for the following reasons: (1) Data were not provided for a majority of the regulated constituents; (2) untreated waste data were not provided, and, therefore, no determination of substantial treatment could be made; (3) detection limits were not provided for undetected samples; and/or (4) treatment was not demonstrated for a majority of the regulated metal constituents.

Treatment performance data that were considered in developing promulgated treatment standards for metal constituents in K048–K052 nonwastewaters are discussed in detail in the amendment to the BDAT background document for these wastes located in the RCRA docket. Statistical comparison showed that data sets for stabilization of solvent extraction raffinate submitted by Exxon and BP America demonstrated better treatment for chromium than the data generated by EPA, as well as that submitted by Amoco for stabilization of incinerator ash. In addition, data submitted by industry indicated significantly higher levels of nickel in the untreated waste than in the waste stabilized by the Agency.

Several commenters stated that the data generated by EPA showed only marginal evidence of treatment by stabilization, and that an error was made in calculating the treatment standard for nickel in K048–K052 nonwastewaters. The Agency acknowledges the error made in the treatment standard calculation for nickel, and agrees with the commenters that marginal evidence of stabilization treatment is shown in the EPA generated data regarding arsenic and selenium. In addition, none of the industry data submitted show substantial treatment for these two constituents. Therefore, the Agency is deleting treatment standards for arsenic and selenium in K048–K052 nonwastewaters. Further, to ensure that the Agency is accounting for the maximum variability in metals concentrations in K048–K052 wastes, the Agency is using the data sets submitted by Exxon and BP America to revise the treatment standard for nickel. Finally, the treatment standard for chromium remains as promulgated in the First Third Rulemaking because the data submitted by Exxon and BP America, as well as by Amoco, indicate that the treatment standard is achievable for the complete range of K048–K052 wastes tested using stabilization treatment.

(2) *BDAT Treatment Standards for Organic Constituents.* Today's rule revises the treatment standards for all sixteen regulated organic constituents in K048–K052 nonwastewaters. In revising these standards, the Agency considered the treatment performance data submitted by industry for the following technologies: CF Systems' three-pass solvent extraction, BP America's multicycle solvent extraction, RCC's solvent extraction, and TDI's high temperature thermal distillation.

The majority of the aforementioned data could not be considered in developing this promulgated rulemaking for the following reasons: (1) Data were not provided for a majority of the regulated organic constituents; (2) untreated waste data were not provided and, therefore, no determination of substantial treatment could be made; (3) a majority of the regulated organic constituents were not detected in the untreated waste; (4) detection limits for the treated waste were several orders of magnitude higher than those achieved in other treated waste data sets, indicating non-optimized laboratory procedures; (5) treatment was not demonstrated for a majority of the regulated organic constituents; and/or, (6) adequate QA/QC data were not provided.

The remaining data sets met the Agency's screening criteria and were used with Agency-generated data from Amoco's fluidized bed incineration and CF Systems' five-pass solvent extraction treatment tests to calculate promulgated treatment standards for organic constituents in K048–K052 nonwastewaters. These treatment performance data are discussed in detail in the amendment to the BDAT background document for these wastes located in the RCRA docket.

Several commenters stated that the data used by EPA to develop the treatment standards do not reflect the wide variability in refinery wastes, and suggested that the Agency use data submitted by the petroleum refining industry to develop a larger database for calculation of treatment standards. However, one commenter stated that the Agency's current use of a variability factor in treatment standard calculations is sufficient, and additional factors to account for waste feed variability would bias the data.

The Agency has addressed the commenters' concerns regarding waste variability in calculating the revised treatment standards for K048–K052 promulgated in today's rule. The data sets that met the Agency's screening criteria were reviewed to determine the most difficult to treat waste (typically containing the highest concentration value) for each regulated constituent. The corresponding treated waste concentration was then multiplied by a variability factor of 2.8 (this variability factor is used by the Agency when attempting to account for variability with only one data point (see the BDAT Methodology Background Document located in the RCRA docket)) to determine the treatment standard for each constituent. A more detailed discussion of the calculation of revised treatment standards for the K048–K052 nonwastewater organics may be found in the amendment to the BDAT background document for these wastes located in the RCRA docket.

Several commenters stated that currently available solvent extraction processes, including the propane extraction system (CF Systems') tested by the Agency, cannot meet the proposed BDAT standards. One commenter stated that the propane extraction system tested by the Agency to develop the proposed treatment standards for organic constituents in K048–K052 nonwastewaters cannot be considered BDAT because it is a pilot-scale unit and, therefore, is not "demonstrated."

The Agency reminds the commenters that BDAT is technology-specific, not process-specific. BDAT for K048–K052 nonwastewater organics is solvent extraction and incineration, both of which are demonstrated treatment technologies for K048–K052 wastes, and data considered by the Agency from both technologies have been used to develop the promulgated treatment standards, thereby ensuring that the treatment standards would not preclude the use of either technology.

The Agency also points out that although the treatment standards were specifically calculated using data from CF Systems' solvent extraction unit, data submitted by RCC shows that their amine extraction technology would be able to meet the treatment standards for all regulated constituents except bis(2-ethylhexyl) phthalate. (High treated waste concentrations reported by RCC for bis(2-ethylhexyl) phthalate were apparently a result of laboratory contamination.) However, the RCC data were bench-scale and could not be considered further since pilot- and full-scale data were available to the Agency. BP America's solvent extraction data, which were used to promulgate treatment standards for K048–K052 nonwastewater organics in the first third rule, indicate that this technology can meet all but four of the revised treatment standards, those for ethylbenzene, bis(2-ethylhexyl) phthalate, as well as the new standards

for xylenes and naphthalene. Also, limited data available from TDI's high temperature thermal distillation unit show that it can meet all of the BDAT treatment standards and should be considered an equivalent BDAT technology to incineration and solvent extraction.

Several commenters stated that BDAT for refinery wastes should be based on both incineration and solvent extraction. As discussed above, treatment data available to the Agency from both technologies were used to develop the revised treatment standards. Therefore, both technologies can meet the revised promulgated standards. Although the solvent extraction data showed somewhat higher treated waste concentrations than the incineration data, the organic constituent removal efficiency for solvent extraction (98% on average) is close to that for available incineration data (99.7% on average). Additionally, solvent extraction provides the benefit of recovering as much as 365,000 barrels of oil per year (provided all of the K048–K052 waste generated per year is treated using solvent extraction technologies versus incineration technologies). This recovery benefit can also be realized using high temperature thermal distillation technologies.

The Agency notes, however, that in choosing to base treatment standards on solvent extraction as well as on incineration, it has chosen a technology that does not destroy or remove toxicants as well as incineration. EPA believes this is a permissible and rational choice to make given that solvent extraction is a recovery technology and the law voices a strong preference for use of such technologies. See, e.g., H.R. Rep. No. 198, 98th Cong. 1st Sess. 31. In addition, solvent extraction does perform substantial treatment on these wastes. Thus, the Agency believes its choice to be consistent with the language of section 3004(m) and also overall statutory goals of encouraging material reuse and waste minimization. See, e.g. RCRA section 1003(6).

Several commenters stated that the treatment standards for xylenes and naphtalene in K048–K052 nonwastewaters, reserved at the time of promulgation of the first third rule, should be based on data recently submitted by the petroleum refining industry or should be transferred from other regulated constituents with similar chemical structures. One commenter stated that the proposed treatment standards for ethylbenzene and phenanthrene in K048–K052 nonwastewaters should not be promulgated because they are below the practical quantitation limits (PQLs) for these constituents. Another commenter stated that none of the BDAT treatment standards should be set below PQLs.

The Agency points out that none of the K048–K052 nonwastewater organic treatment standards are being promulgated at levels below the PQLs for their respective constituents as listed in SW–846 for low level soil, the most similar matrix to incinerator ash and solvent extraction residues of the four matrices for which PQLs are given. In addition, the commenters should keep in mind that the PQLs in SW–846 were established to provide guidance for the analysis of waste samples by establishing minimum performance criteria for analytical laboratories. The PQLs listed in SW–846 do not necessarily represent the lowest limits of analytical performance achievable for any given waste. The PQLs the commenter refers to were obtained from analyzing a non-K048–K052 incinerator ash. The treatment standards for all regulated organic constituents in K048–K052 nonwastewaters are based on data submitted by industry, and the Agency believes that both solvent extraction and incineration technologies can reliably meet these standards on a routine basis.

The Agency wishes to clarify that it believes that combined treatment of the K048–K052 wastes is appropriate and does not constitute impermissible dilution of the more concentrated wastes. This is because these wastes are generated from similar processes, contain similar contaminants, and are amenable to the same treatment technologies. Although the K051 wastes appear to contain higher contaminant concentrations than the other petroleum wastes, the Agency does not consider combined treatment of the petroleum refining wastes to be impermissible dilution of the K051 wastes. In public comments to the proposed treatment standards for these wastes in the First Third rulemaking, which comments were referenced in comments to the proposal in this proceeding, the petroleum refining industry urged EPA to "consider the biological treatment and metal fixation that occurs in a land treatment facility, in tandem with other viable treatment methods as means of meeting the section 3004(m) treatment requirements." Comments of American Petroleum Institute (API), May 23, 1988, p. 44. Although land treatment is a type of land disposal (see section 3004(k)), the argument apparently is that in assessing the level of pre-disposal treatment to impose pursuant to section 3004(m), the postdisposal treatment that occurs in the land treatment unit should also be considered.

EPA responded in the First Third rulemaking that the statute forecloses the result that API is seeking. Land treatment is a type of land disposal and the statute states that a waste must meet the section 3004(m) standards before it is land disposed. See, e.g., Response to Comment Background Document at Docket LDR–9 p. 1621 (August, 1988). EPA continues to believe that the statute is unambiguous on this point: All treatment necessary to meet the section 3004(m) standards must occur before the waste is land disposed. Put another way, the level of pretreatment required before land disposal is not influenced by any treatment that may occur after land disposal. See RCRA sections 3004 (d), (e), and (g) (land disposal can only occur in units receiving waste that "has complied with the pretreatment regulations promulgated under" section 3004(m), or in no-migration units); *see also* RCRA section 3004(m)(2) (hazardous waste may be disposed of "if such waste has been treated to the level or by a method specified in regulations promulgated under this subsection").

EPA continues to believe that these provisions are unambiguous. However, even if it were determined that the Agency has some discretion to interpret these provisions (*see Chevron U.S.A. Inc.* v. *NRDC,* 467 U.S. 837, 843 (1984) stating that "if the statute is silent or ambiguous with respect to the specific issue, the question for the court is whether the agency's answer is based on a permissible construction of the statute"), then the Agency would reach the same result. In our view, the statute is directed to eliminating the "long-term uncertainties associated with land disposal" (see sections 3004 (d)(1)(A), (e)(1)(A) and (g)(5)) before land disposal occurs. Hazardous wastes also are to be "manag(ed) * * * in an appropriate manner in the first instance". Sections 3004 (d)(1)(B) (e)(1)(B), and (g) (5). The most readily available means of achieving these enumerated statutory goals, and the one directly commanded by Congress, is through imposition of the section 3004(m) pretreatment standards (i.e., standards that apply before land disposal). Any section 3004(m) standard that took into account possible treatment after land disposal had occurred would be relying on the "long-term uncertainties associated with land disposal" to achieve the object of section 3004(m): Substantial reductions in waste toxicity and mobility so that

threats to human health and the environment are minimized. This is not a reasonable way to construe the land disposal restriction provisions.

In addition, the reading urged by API would amount, as a practical matter, to an end run around the no migration test in sections 3004 (d), (e), and (g). The result advocated by API would result in partially treated wastes being disposed of in units that had not satisfied the no migration standard. This again is at odds with the natural reading of the statutory scheme which indicates only two alternatives for disposing of prohibited wastes: disposal in a no migration unit or disposal after satisfying the section 3004(m) standard. Again, this appears to EPA to be the very result that Congress legislated against.[2]

The approach API urges is also at odds with the BDAT approach the Agency has adopted to establish the section 3004(m) treatment standards. It would also be at odds with the approach EPA recently outlined that would cap BDAT treatment levels if those levels were ever below *de minimis* concentration levels of hazardous constituents established by EPA as a threshold for determining when threats from land disposal are minimized and wastes are no longer hazardous. See 55 FR 6640 (Feb. 26, 1990). The Agency thus believes it far more reasonable to go forward with its existing interpretation which does not undermine its approach to establishing treatment standards. (This approach was recently upheld as consistent with the statute in *Hazardous Waste Treatment Council* v. *EPA*, 886 F. 2d 355 (D.C. Cir. 1989).)

In short, EPA believes that it is reasonable to read the statute to require that all pretreatment of prohibited wastes occur before they are land disposed. Further, the Agency has determined in today's rule the extent of treatment that satisfies the section >3004(m) standard for the K048–052 wastes. Thus, this level of treatment is required before the wastes can be land disposed (unless disposal is into a no-migration unit).

[2] In fact, the scheme being advocated appears to resemble the original House version of the land disposal restriction provisions, which authorized the Agency to evaluate different forms of land disposal under different standards in determining which wastes were prohibited, and did not contain a no-migration test or a mandatory pretreatment provision. See section 5(c) of H.R. 2867, as reported at H.R. Rep. No. 198, 98th Cong., 1st Sess. 4–5 (1983). This scheme was not enacted, but rather was replaced by the present statute.

EPA also finds API's position to be unreasonable because it ignores section 3005(j)(11) which specifically authorizes land disposal in surface impoundments of wastes not meeting the section 3004(m) pretreatment standards provided that certain conditions are met. EPA believes that this provision indicates that when Congress intended to allow the land disposal of wastes not yet satisfying the section 3004(m) standards into land disposal units not meeting the nonmigration test, it said so explicitly. There is no such provision applicable to disposal in land treatment units.

BDAT Treatment Standards for K048, K049, K050, K051 and K052

[Wastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/l)
Cyanides (total)	0.028

Revised BDAT Treatment Standards for K048

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/kg)
Benzene	14
Benzo(a)pyrene	12
Bis(2-ethylhexyl)phthalate	7.3
Chrysene	15
Di-n-butylphthalate	3.6
Ethylbenzene	14
Naphthalene	42
Phenanthrene	34
Phenol	3.6
Pyrene	36
Toluene	14
Xylenes (total)	22

Regulated constituent	Maximum for any single grab sample, TCLP (mg/l)
Chromium (total)	1.7
Nickel	0.20

Revised BDAT Treatment Standards for K049

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/kg)
Anthracene	28
Benzene	14
Benzo(a)pyrene	12
Bis(2-ethylhexyl)phthalate	7.3
Chrysene	15
Ethylbenzene	14
Naphthalene	42
Phenanthrene	34
Phenol	3.6
Pyrene	36
Toluene	14
Xylenes (total)	22

Regulated constituent	Maximum for any single grab sample, TCLP (mg/l)
Chromium (total)	1.7
Nickel	0.20

Revised BDAT Treatment Standards for K050

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/kg)
Benzo(a)pyrene	12
Phenol	3.6

Regulated constituent	Maximum for any single grab sample, TCLP (mg/l)
Chromium (total)	1.7
Nickel	0.20

Revised BDAT Treatment Standards for K051

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/kg)
Anthracene	28
Benzene	14
Benzo(a)anthracene	20
Benzo(a)pyrene	12
Bis(2-ethylhexyl)phthalate	7.3
Chrysene	15
Di-n-butylphthalate	3.6
Ethylbenzene	14
Naphthalene	42
Phenanthrene	34
Phenol	3.6
Pyrene	36
Toluene	14
Xylenes (total)	22

Regulated constituent	Maximum for any single grab sample, TCLP (mg/l)
Chromium (total)	1.7
Nickel	0.20

REVISED BDAT TREATMENT STANDARDS FOR K052

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/kg)
Benzene	14
Benzo(a)pyrene	12
o-Cresol	6.2
p-Cresol	6.2
Ethylbenzene	14
Naphthalene	42
Phenanthrene	34
Phenol	3.6
Toluene	14
Xylenes (total)	22

Regulated constituent	Maximum for any single grab sample, TCLP (mg/l)
Chromium (total)	1.7
Nickel	0.20

r. K060

K060—Ammonia still lime sludge from coking operations.

In today's rule, the Agency is promulgating wastewater treatment standards for organic and cyanide constituents as proposed based on the performance of biological treatment followed by settling and clarification. These treatment standards are transferred from the Office of Water Development Document for Effluent Limitations Guidelines and Standards for the Iron and Steel Industry Manufacturing Point Source Category Coke Making Subcategory. In addition, the Agency is promulgating nonwastewater treatment standards for organic and cyanide constituents as proposed based on a transfer of the performance of incineration for K087 wastes, which are generated from the same industry as K060 wastes (coking industry) and have similar or higher concentrations of K060.

In the November 22, 1989, proposed rule, the Agency transferred the performance of alkaline chlorination for F007 through F009 wastewaters to the cyanide constituent of K060 wastewaters. The Agency believed that this was a technically feasible transfer because the F007 through F009 wastewaters were more difficult to treat as a result of the higher concentration of cyanides. Since that time, the Agency has reevaluated the performance of biological treatment for K060 wastewaters and believes that for this waste biological treatment can achieve similar treatment levels for low-concentration cyanides similar to those achieved by alkaline chlorination. Therefore, the Agency is promulgating a numerical treatment standard for the cyanide constituent in K060 wastewaters based on the performance of biological treatment followed by settling and clarification.

The Agency received no comments on the applicability of the technical transfer of the performance of the technologies for these wastes. Therefore, the Agency is promulgating concentration-based treatment standards for this waste as proposed.

BDAT TREATMENT STANDARDS FOR K060

[Revised from no land disposal]

[Wastewaters]

Regulated constituent	Maximum for any 24-hour composite sample, total composition (mg/l)
Benzene	0.17
Benzo(a) pyrene	0.035
Naphthalene	0.028
Phenol	0.042
Cyanides (Total)	1.9

BDAT TREATMENT STANDARDS FOR K060

[Revised from no land disposal]

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/kg)
Benzene	0.071
Benzo(a) pyrene	3.6
Naphthalene	3.4
Phenol	3.4
Cyanides (Total)	1.2

s. K061

K061—Emission control dust/sludge from the primary production of steel in electric furnaces.

In today's rule, the Agency is promulgating wastewater treatment standards for cadmium, chromium, and nickel in K061 wastes as proposed. The treatment standards are based on the performance of chemical reduction, followed by precipitation with sulfides and lime, and sludge dewatering as was set for K062 wastes. For lead, the Agency is promulgating wastewater treatment standards based on data received from the foundry industry. The treatment standard is based on the performance of precipitation with magnesium hydroxide and filtration for wastewaters generated from a cupola furnace. The Agency believes that the performance of this treatment system can achieve the promulgated treatment standards for the other metals (cadmium, chromium, and nickel) because of the metal hydroxide solubilities.

Many commenters also suggested that the Agency develop treatment standards for this waste based on a transfer of treatment data from the Effluent Guidelines Point Source Category of the Iron and Steel Manufactures. The Agency disagrees with the commenters and does not believe that Effluent Guidelines data represents a K061 wastewater. The data show low level of metals in the waste and there is no corresponding influent and effluent concentration levels for the metals. EPA therefore excluded this data in the development of the treatment standards.

Many commenters suggested that the transfer of the performance of treatment for K062 was not an appropriate transfer due to the chemical and physical differences between the two wastes, i.e., pH of wastewaters, influent lead concentrations, and settling differences between hydroxides (K062) and oxides (K061). The Agency disagrees with the commenters and believes that chemical and physical differences between the two wastes does not prevent treatment to the same concentration level. The Agency believes that changes to the treatment system such as the addition of other precipitating agents to alter the pH can aid in the performance of the treatment system thereby achieving the treatment standards.

In addition, the Agency received data from generators of K061 wastewaters. These data indicated that K061 wastewaters contained higher concentration of lead than are typically found in K062 wastewaters. Therefore, the Agency evaluated all of the available wastewater data from comment submissions and from the Effluent Guidelines database. Data submitted by the foundry industry indicated that lead concentrations can be substantially reduced by precipitation and filtration. The Agency believes that these treatment data better represent the typical concentration of lead found in K061. Therefore, the Agency is using these data to develop a numerical treatment standard for lead. The calculation of the treatment standard can be found in the Final Addendum Background document for K061 wastewaters.

EPA promulgated treatment standards for nonwastewater forms of K061 as part of the First Third final regulation on August 8, 1988. Two subcategories for nonwastewater forms of K061 were defined: the low zinc subcategory (less

than 15%) and the high zinc subcategory (greater than 15%). The treatment standard for the low zinc subcategory was based on the performance of stabilization. For the high zinc subcategory, the final standard was "No Land Disposal Based on High Temperature Metals Recovery as a Method of Treatment" technology (53 FR 31221). Due to a shortage in high temperature metals recovery capacity, the effective date of this treatment standard was delayed until August, 1990. An interim numerical standard based on performance of stabilization technology is in force until that time.

In the proposed rule, the Agency requested comments on the extension of the existing, interim treatment standard for another year. The Agency received comments indicating that industry is in the process of building recovery processes, thus alleviating the Agency's concern at proposal that an additional extension of the interim stabilization standard would reward dilatory conduct in developing optimal treatment. The Agency believes it appropriate to extend the interim standard as an alternative to high temperature recovery for one additional year.

The Agency also proposed to amend the existing treatment standard for high zinc K061 wastes to be resmelting in a high temperature metal recovery furnace. EPA has decided not to amend the existing standard. The standard itself is presently under review by a panel of the District of Columbia Circuit Court of Appeals (*API* v. *EPA*, No. 88–1606) and the Agency is concerned that the change in the treatment standard it proposed could confuse the matters at issue in that case without resolving them. The Agency therefore has decided not to change the description of the existing treatment standards for these wastes.

BDAT TREATMENT STANDARDS FOR K061

[Wastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/l
Cadmium	1.61
Chromium	0.32
Lead	0.51
Nickel	0.44

t. K086

K086—Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from the cleaning of tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.

Today's rule revokes most of the treatment standards promulgated in the First Third final rule (53 FR 31168, August 17, 1988) for K086 (solvents-wash subcategory). Today's rule, however, keeps the previously promulgated treatment standards for metals regulated in K086.

In the proposed Third Third rule, EPA explained its determination not to subcategorize K086 (beyond subcategorization for wastewaters and nonwastewaters). This determination was based on the available characterization data of K086 and on the available treatment performance data for wastes believed as difficult to treat as K086. Commenters concurred and supported EPA's determination for regulating two forms of K086. The Agency is thus adopting this proposed approach in the final rule of K086 wastes.

The Agency proposed to revise most of the existing treatment standards for organic constituents regulated in the K086 solvent wash subcategory waste. (The existing treatment standards were promulgated in the First Third final rule (see 53 FR 31220, August 17, 1988)). Also, the Agency proposed to expand the list of regulated constituents in K086 to include acetohenone, di-n-butylphthalate, butylbenzylphthalate, diethylphthalate, dimethylphthalate, di-n-octylphthalate, and cyanide (total). This list of additional organics is adopted in today's rule. As noted in the Third Third proposed rule and the proposed BDAT Background Document Addendum for K086, the proposed revisions to the K086 treatment standards are consistent with the U and P treatment standards development protocol unless otherwise noticed. All the proposed treatment standards for K086 wastes were based on incineration.

Commenters fully supported the proposed revisions to the treatment standards for K086. They point out that the proposed standards for most of the constituents are more representative of K086 wastes. However, commenters also urged the Agency to develop the treatment standards for organics in K086 wastewaters based on performance data from wastewater treatment technologies rather than on incineration scrubber waters.

As stated in the Final Rule for Land Disposal Restrictions for Second Third Wastes (54 FR 26629) and reiterated in the proposed rule for Third Third Wastes (54 FR 48390), when the Agency has appropriate wastewater treatment data from well-designed and well-operated wastewater treatment units, it prefers to use these data rather than scrubber water concentrations to develop wastewater treatment standards.

Commenters on the proposed First Third, Second Third, and Third Third rules almost unanimously supported that EPA should promulgate wastewater standards based on the performance of specific wastewater treatment rather than incinerator scrubber water constituent levels. After reviewing all available data and comments, the Agency agrees with this comment, and is promulgating concentration-based treatment standards based on wastewater treatment data rather than scrubber water for all wastes that were proposed in the rule for Third Third Wastes. While the Agency did not specifically identify the standards based on wastewater treatment data as alternatives for F and K wastewaters, the Agency believes that this is a logical outgrowth of the notice and comment process. As such, the Agency is today modifying the wastewater treatment standards for K086.

The treatment standards promulgated today for organics in wastewater forms of K086, are based on performance data generated from a combination of two or more of the following BDAT technologies: biological treatment, steam stripping, carbon adsorption, liquid extraction, and other. (See section III.A.6. of today's preamble for a discussion of these performance data.) These treatment standards are expressed as concentration-based standards; however technologies capable of reaching the standard are not excluded from being used.

Comments were received indicating detection limit discrepancies in nonwastewater forms that contain cyclohexanone and methanol. Based on the available data, EPA believes that cyclohexanone and methanol may not be amenable to quantification and a concentration based treatment standards may not be a viable regulatory option. (See section III.A.5.6.)

Cyclohexanone and methanol are two of several organic constituents that were proposed for regulation in K086 wastes. Due to complications in analysis for these two constituents in nonwastewater treatment residues, EPA is withdrawing cyclohexanone and

methanol from the list of regulated constituents for K086 nonwastewaters. EPA identified other organic constituents in K086 that are as difficult to treat as cyclohexanone and methanol and thus believe that by regulating these other organic constituents, cyclohexanone and methanol should also be treated. However, EPA is still promulgating revised treatment standards for cyclohexanone and methanol in wastewater forms of K086. Available data for cyclohexanone and methanol containing wastewater do not indicate any analytical problems similar to those in nonwastewaters containing cyclohexanone and methanol. Therefore, EPA determined it is not necessary to specify a method of treatment or an indicator or surrogate constituent for these two constituents in nonwastewater forms of K086.

EPA is reaffirming the treatment standards for chromium (total) and lead for all forms of K086 wastes, as explained below. Today's rule abolishes 086 waste subcategories (beyond astewaters and nonwastewaters) and vokes almost all of the treatment andards promulgated on August 17, 88 (53 FR 31167). However, EPA is taining the wastewater and nwastewater chromium and lead eatment standards that were tablished in the First Third final rule d making them applicable to all forms K086. These standards are based on e wastewater treatment residues sulting from the hexavalent chromium duction to trivalent chromium llowed by chemical precipitation and tration of a wastewater believed milar to K086 wastewaters.

The treatment standards for cyanide otal) are based on residues from the kaline chlorination of wastewaters ntaining cyanide. Detailed formation for the development of the eatment standards for all these gulated constituents can be found in e Final Addendum BDAT Background ocuments for K086.

DAT TREATMENT STANDARDS FOR K086

[Wastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/l)
etone	0.28
etophenone	0.010
Butyl alcohol	5.6
clohexanone	0.36
2-Dichlorobenzene	0.088
ethyl isobutyl ketone	0.14
ethyl ethyl ketone	0.28
anides (Total)	1.9

BDAT TREATMENT STANDARDS FOR K086—Continued

[Wastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/l)
Chromium (Total)	0.32
Lead	0.037

Regulated constituent	Maximum for any composite sample, total composition (mg/l)
Bis(2-ethylhexyl)phthalate	0.28
Butylbenzylphthalate	0.017
Diethyl phthalate	0.20
Dimethyl phthalate	0.047
Di-n-butyl phthalate	0.057
Di-n-octyl phthalate	0.017
Ethyl acetate	0.34
Ethyl benzene	0.057
Methanol	*5.6
Methylene chloride	0.089
Naphthalene	0.059
Nitrobenzene	0.068
Toluene	0.080
1,1,1-Trichloroethane	0.054
Trichloroethylene	0.054
Xylenes (Total)	0.32

*Standard for methanol is based on analysis of a composite sample using SW-846 Method 8000.

BDAT TREATMENT STANDARDS FOR K086

[Nonwastewaters]

Constituent	Maximum for any single grab sample, total composition (mg/kg)
Acetone	160
Acetophenone	9.7
Bis(2-ethylhexyl)phthalate	28
n-Butyl alcohol	2.6
Butylbenzylphthalate	7.9
1,2-Dichlorobenzene	6.2
Diethyl phthalate	28
Dimethyl phthalate	28
Di-n-butyl phthalate	28
Di-n-octyl phthalate	28
Ethyl acetate	33
Ethyl benzene	6.0
Methyl isobutyl ketone	33
Methyl ethyl ketone	36
Methylene chloride	33
Naphthalene	3.1
Nitrobenzene	14
Toluene	28
1,1,1-Trichloroethane	5.6
Trichloroethylene	5.6
Xylenes (Total)	28
Cyanide (Total)	1.5

Regulated constituent	Maximum for any single grab sample, TCLP (mg/l)
Chromium	0.094
Lead	0.37

5. Development of Treatment Standards for U and P Wastewaters and Nonwastewaters Excluding Metal Salts and Organometallics

Today's rule promulgates treatment standards for wastewater and nonwastewater forms of U and P wastes (as defined in 40 CFR 261.33(e) and (f)) that are identical to treatment standards for multi-source leachate identified as F039 (see section III.A.6. for additional discussion of treatment standards for multi-source leachate). Thus, this section of the preamble presents a discussion of the development of these standards. Treatment standards for other U and P wastes that are listed specifically as metal salts or organometallics are discussed in previous sections of today's rule. (**Note:** Treatment standards for additional U and P wastes have already been promulgated in 53 FR 31174 (August 17, 1988) and 54 FR 26594 (June 23, 1989)).

This section of the preamble also includes a discussion of the promulgated treatment standards for U and P wastes that have been identified as potentially reactive, exist primarily as gases, or are cyanogens. The specific U and P waste codes covered by the following discussion are listed at the end of this section in the table of standards.

In the proposed rule, EPA grouped all of the U and P wastes into various treatability groups based on similarities in elemental composition (e.g., carbon, halogens and metals) and the presence of key functional groups (e.g., phenolics, esters, and amines) within the structure of the individual chemical. The Agency has also accounted for physical and chemical factors that are known to affect the selection of treatment alternatives and to affect the performance of the treatment, such as volatility and solubility, when developing these treatability groups. The use of the chemical (e.g., pesticides and pharmaceuticals) was also important in establishing these groups. Emphasizing the use of these chemicals allowed the Agency to identify issues specific to these groups of chemicals, to target potential sources of data, and to solicit comments and data from specific industries and public interest groups.

While the Agency presented the proposed treatment standards for U and P wastes according to these treatability groups, the promulgated treatment standards are presented in this section according to the physical form (i.e., wastewaters and nonwastewaters) and whether the treatment standards are concentration-based or technology-based. More information on the

development of specific treatment standards for these wastes can be found in the background document for U and P wastes. While the background documents for these wastes in the proposed rule were presented according to treatability groups, only one background document (in five volumes) for these wastes exists for the final rule and is presented similar to the following discussion.

a. Concentration-based Standards for Specific Organics

The regulated constituents for the U and P wastes for which the Agency is promulgating concentration-based standards generally are those specific constituents for which the U and P waste is listed (as specified in 40 CFR 261.33 (e) and (f)). However, for several U and P wastes additional constituents have been selected for regulation for various reasons. More detail on the selection of regulated constituents can be found in the proposed background documents. The regulated constituents for these wastes and the promulgated treatment standards are presented in the tables at the end of each section. See also treatment standards for F039 in section III.A.6. of today's rule.

(1) *Wastewaters.* As explained in preamble section III.A.1, the Agency is adopting in this notice the definition of wastewaters that was used to promulgate treatment standards in the First and Second Third final rules—that is, wastewaters are those wastes containing less than 1% TOC and less than 1% TSS. See also the general discussion of the wastewater definition in section III.A.1. of today's rule. More detailed information on the wastes covered by this section can be found in the Final BDAT Background Document for U and P Wastes and Multi-Source Leachates (F039), Volume A: Wastewater Forms of Organic U and P Wastes and Multi-Source Leachates (F039) For Which There Are Concentration-based Treatment Standards.

In the November 22, 1989 proposed rule for Third Third wastes, the Agency proposed two alternative sets of concentration-based standards for most of these wastewaters. One set of standards was based on the concentration of these constituents in incinerator scrubber water. These scrubber water numbers were proposed because the Agency was not certain that the alternate standards would be available in time for proposal. The alternate set of standards was based on a transfer of performance data from various sources including: (1) The Office of Water's Industrial Technology Division (ITD) and National Pollution Discharge Elimination System (NPDES) data (specifically from the Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) database); (2) the Hazardous Waste Engineering Research Laboratory (HWERL) database; (3) the Office of Solid Waste's BDAT data (from previous land disposal restrictions rules); and (4) additional wastewater treatment data from literature articles on wet air oxidation (WAO) and PACT. These alternative wastewater treatment standards were presented in section III.A.7. of the proposed Third Third rule as treatment standards for wastewater forms of multi-source leachate. When the Agency has appropriate wastewater treatment data from well-designed and well-operated wastewater treatment units, it prefers to use these data rather than scrubber water concentrations to develop wastewater treatment standards. (This does not, however, preclude the Agency from establishing treatment standards for other wastes based on constituent concentrations in incinerator scrubber waters.) Also, commenters unanimously requested that the U or P wastewater standards be based on the performance of biological treatment rather than incinerator scrubber water constituent levels. For these reasons, the Agency has chosen to finalize the treatment standards based on the proposed alternate standards with some revisions. None of today's final wastewater standards in this section are based on scrubber water concentrations.

As stated in the November 22, 1989 proposed rule, the Agency also conducted wastewater treatment tests for selected U and P chemicals using wet air oxidation, powdered activated carbon treatment (PACT), and carbon adsorption. In addition to these data, the Agency received performance data on the treatment of multi-source leachate wastewaters just prior to proposal. The results of these tests were not available in time to analyze for the proposal, but were placed in the administrative docket to the proposed rule and noticed for comment.

Most of the aforementioned data supported the achievability of EPA's preferred proposed treatment standards (the alternate set of standards). The Agency reviewed all of these data during the comment period to determine whether they could be considered best demonstrated available technology. In reviewing these data, the Agency also considered the influent concentration of the treated constituent, whether the treated stream was representative of that U and P wastewater, and how achievable the detection limit is in similar or other matrices based on other data received. The Agency has revised some of the proposed wastewater standards in this final rule based on data received just prior to proposal.

Commenters requested that the U and P wastewater standards be based on the performance of biological treatment rather than wet air oxidation followed by PACT. Where biological treatment data were not available, the Agency promulgated standards as proposed based on Office of Water data, or in some cases, used wastewater data based on the performance of wet air oxidation followed by PACT or wastewater data generated by treaters of leachate.

Proposed standards were revised for a number of reasons: (1) Based on a review of recently received multi-source leachate wastewater data, (2) based on a review of the recently completed wet air oxidation/PACT study and (3) based on a review of the existing data used to generate the proposed standards and comments received on the proposed standards. More detail on these revisions can be found on a constituent basis in the background document for these wastewaters. Where proposed standards were inconsistently large because of poor data availability, the Agency reviewed alternate sources of data to develop standards that are more consistent with similar constituents but still considered achievable by treatment. The following discussion explains in more detail the rationale for these revisions to the proposed standards. The constituents for which standards were changed from the proposed standards as presented in section III.A.7. of the Third Third proposed rule as treatment standards for wastewater forms of multi-source leachate are listed in a table at the end of this section. This table includes multi-source leachate organic constituents as well as U and P organic wastewaters.

Constituents for which multi-source leachate data were used to develop standards are given the reference code (1), Revisions Based on Multi-Source Leachate Data, in the table at the end of this section. For the majority of constituents, the multi-source leachate data supported the achievability of the proposed standards. Some of the multi-source leachate data were not used, however, because they did not show substantial treatment. Where multi-source leachate data showed a proposed standard could not be met, and demonstrated substantial treatment using a technology that could be considered BDAT, those data were used

instead. Also, where a constituent had an exceedingly large standard because of lack of good data, multi-source leachate data were used to develop a more appropriate standard whenever possible.

Constituents for which WAO/PACT data were used to develop standards are given the reference code (2), Revisions Based on WAO/PACT Data, in the table at the end of this section. More information on these data can be found in the Onsite Engineering Report of Wet Air Oxidation and PACT System Treatability Study at Zimpro/Passavant, March 1990. The Agency found that WAO followed by PACT performed better than WAO alone. Influent concentrations were designed to be high enough to represent U and P wastewaters. These data demonstrated that a number of constituents could be substantially treated by wet air oxidation followed by PACT. Where these data showed substantial treatment, they were used to develop standards for constituents for which the Agency does not have good biological treatment data or multi-source leachate data demonstrating substantial treatment.

Constituents for which the Agency reexamined the data that were used for proposal are given the reference code (3), Revisions Based on Review of Existing Data, in the table at the end of this section. The data sources and transfer choices used for the proposed standards were reevaluated. These constituents include those for which changes were made as a result of comments on the proposed standards. The standards in this category were changed for a variety of reasons. The standards for 1,4-Dioxane and ethylene oxide, which were inconsistently larger than other constituents in their treatability group, were revised based on a transfer of treatment data from ethyl ether. The standards for methacrylonitrile and propanenitrile (ethyl cyanide), which were inconsistently larger than other constituents in their treatability group, were revised based on a transfer of treatment data for acrylonitrile. The standard for 1,1,2-Trichloro-1,2,2-trifluoroethane was revised based on a transfer of treatment data from hexachloroethane. The remaining constituents in this category have revised standards due to a change in the methodology for calculating variability factors and accuracy correction factors when HWERL or NPDES data were used to develop treatment standards. More information on these revisions can be found in the background document for these wastewaters.

None of today's promulgated U and P wastewater standards are based on incinerator scrubber water. However, it should be noted that when the Agency promulgates concentration-based standards, the regulated community may use any method of treatment to achieve these standards, so long as it does not constitute land disposal or impermissible dilution.

Many of the new wastewater data include analysis of composite samples rather than grab samples. Thus, the Agency has developed many of the concentration-based treatment standards based on an analysis of composite samples rather than grab samples. Where data from analysis of composite samples were used, the Agency so indicates in the appropriate table of treatment standards at § 268.43. More information on the Agency's use of grab and composite standards can be found in the preamble section III.A.1.

The Chemical Manufacturing Association (CMA) calculated wastewater treatment standards for many constituents based on data contained in the OCPSF database using a modified BDAT Methodology, and submitted these suggested limits to the Agency for review. EPA did not use the CMA standards, but did consider the OCPSF data base, the analyses conducted by EPA's Industrial Technology Division, and the BDAT methodology. EPA's analysis differs from CMA's and sometimes produced higher and lower limits. For example, the standard suggested by CMA for chloroform in wastewaters is lower (i.e., more stringent) than that promulgated by the Agency specifically for chloroform in K009 and K010 wastewaters. In developing the BDAT standards, the Agency examined data beyond that contained in the OCPSF data base. Thus, our selection of BDAT sometimes involved the analysis of data beyond that included in CMA's suggested limits.

Finally, EPA is promulgating treatment methods as standards for several wastewater forms of U and P wastes for which the Agency had proposed concentration-based standards. After examining certain information received following the proposed rule, EPA adjusted treatment standards for many nonwastewater forms of U and P wastes and realized that several types of analytical problems associated with nonwastewaters applied to wastewaters as well. Section III.A.5.a.(2), immediately following, discusses these problems at length.

Consequently EPA is promulgating treatment methods as standards for wastewater forms of the following U and P wastes: P082, N-nitrosodimethylamine; U017, benzal chloride; U073, 3,3'-dichlorobenzidine; U074, cis-1,4-dichloro-2-butene; U091 3,3'-dimethoxybenzidine.

CONCENTRATION-BASED BDAT TREATMENT STANDARDS FOR U AND P WASTEWATERS

Waste code	Regulated organic constituents	*Total composition (mg/l)
U002	Acetone	0.28
U003	Acetonitrile	0.17
U004	Acetophenone	0.010
U005	2-Acetylaminofluorene	0.059
U009	Acrylonitrile	0.24
U012	Aniline	0.81
U018	Benz(a)anthracene	0.059
U019	Benzene	0.14
U022	Benzo(a)pyrene	0.061
U024	bis-(2-Chloroethoxy) methane.	0.036
U025	bis-(2-Chloroethyl) ether	0.033
U027	bis-(2-Chloroisopropyl) ether.	0.055
U029	Bromomethane	0.11
U030	4-Bromophenyl phenyl ether.	0.055
U031	n-Butyl alcohol	5.6
U036	Chlordane	0.0033
U037	Chlorobenzene	0.057
U038	Chlorobenzilate	0.10
U039	p-Chloro-m-cresol	0.018
U043	Vinyl chloride	0.27
U044	Chloroform	0.046
U045	Chloromethane (methyl chloride).	0.19
U047	2-Chloronaphthalene	0.055
U048	2-Chlorophenol	0.044
U050	Chrysene	0.059
U051	Pentachlorophenol	0.089
U051	Phenanthrene	0.059
U051	Pyrene	0.067
U052	o-Cresol	0.11
U052	Cresol (m- and p-isomers).	0.77
U057	Cyclohexanone	0.36
U060	o,p'-DDD	0.023
U060	p,p'-DDD	0.023
U061	o,p'-DDE	0.031
U061	p,p'-DDE	0.031
U061	o,p'-DDT	0.0039
U061	p,p'-DDT	0.0039
U063	Dibenzo(a,h)anthracene	0.055
U066	1,2-Dibromo-3-chloropropane.	0.11
U067	1,2-Dibromoethane	0.028
U068	Dibromomethane	0.11
U070	o-Dichlorobenzene	0.088
U071	m-Dichlorobenzene	0.036
U072	p-Dichlorobenzene	0.090
U075	Dichlorodifluoromethane	0.23
U076	1,1-Dichloroethane	0.059
U077	1,2-Dichloroethane	0.21
U078	1,1-Dichloroethylene	0.025
U079	trans-1,2-Dichloroethene	0.054
U080	Methylene chloride	0.089
U081	2,4-Dichlorophenol	0.044
U082	2,6-Dichlorophenol	0.044
U083	1,2-Dichloropropane	0.85
U084	cis-1,3-Dichloropropene	0.036
U084	trans-1,3-Dichloropropene.	0.036

CONCENTRATION-BASED BDAT TREATMENT STANDARDS FOR U AND P WASTEWATERS—Continued

Waste code	Regulated organic constituents	*Total composition (mg/l)
U093	p-Dimethylaminoazobenzene.	0.13
U101	2,4-Dimethyl phenol	0.036
U105	2,4-Dinitrotoluene	0.32
U106	2,6-Dinitrotoluene	0.55
U108	1,4-Dioxane	0.12
U111	Di-n-propylnitrosoamine	0.40
U112	Ethyl acetate	0.34
U115	Ethylene oxide	0.12
U117	Ethyl ether	0.12
U118	Ethyl methacrylate	0.14
U120	Fluoranthene	0.068
U121	Trichloromonofluoromethane.	0.020
U127	Hexachlorobenzene	0.055
U128	Hexachlorobutadiene	0.055
U129	alpha-BHC	0.00014
U129	beta-BHC	0.00014
U129	delta-BHC	0.023
U129	gamma-BHC	0.0017
U130	Hexachlorocyclopentadiene.	0.057
U131	Hexachloroethane	0.055
U137	Indeno(1,2,3,-c,d)pyrene	0.0055
U138	Iodomethane	0.19
U140	Isobutyl alcohol	5.6
U141	Isosafrole	0.081
U142	Kepone	0.0011
U152	Methacrylonitrile	0.24
U155	Methapyrilene	0.081
U157	3-Methylchloanthrene	0.0055
U158	4,4-Methylene-bis-(2-chloroaniline).	0.50
U159	Methyl ethyl ketone	0.28
U161	Methyl isobutyl ketone	0.14
U162	Methyl methacrylate	0.14
U165	Naphthalene	0.059
U168	2-Naphthylamine	0.52
U169	Nitrobenzene	0.068
U170	4-Nitrophenol	0.12
U172	N-Nitroso-di-n-butylamine	0.40
U174	N-Nitrosodiethylamine	0.40
U179	N-Nitrosopiperidine	0.013
U180	N-Nitrosopyrrolidine	0.013
U181	5-Nitro-o-toluidine	0.32
U183	Pentachlorobenzene	0.055
U185	Pentachloronitrobenzene	0.055
U187	Phenacetin	0.081
U188	Phenol	0.039
U192	Pronamide	0.093
U196	Pyridine	0.014
U203	Safrole	0.081
U207	1,2,4,5-Tetrachlorobenzene.	0.055
U208	1,1,1,2-Tetrachloroethane	0.057
U209	1,1,2,2-Tetrachloroethane	0.057
U210	Tetrachloroethene	0.056
U211	Carbon tetrachloride	0.057
U220	Toluene	0.080
U225	Tribromomethane (bromoform).	0.63
U226	1,1,1-Trichloroethane	0.054
U227	1,1,2-Trichloroethane	0.054
U228	Trichloroethene	0.054
U239	Xylene(s)	0.32
U240	2,4-Dichlorophenoxyacetic acid.	0.72
U243	Hexachloropropene	0.035
U247	Methoxychlor	0.25
P004	Aldrin	0.021
P020	2-sec-Butyl-4,6-dinitrophenol.	0.066
P022	Carbon disulfide	0.014
P024	p-Chloroaniline	0.46
P037	Dieldrin	0.017
P047	4,6-Dinitrocresol	0.28
P048	2,4-Dinitrophenol	0.12
P050	Endosulfan I	0.023
P050	Endosulfan II	0.029
P050	Endosulfan sulfate	0.029
P051	Endrin	0.0028
P051	Endrin aldehyde	0.025
P059	Heptachlor	0.0012
P059	Heptachlor epoxide	0.016
P060	Isodrin	0.021
P077	p-Nitroaniline	0.028
P082	N-Nitrosodimethylamine	0.40
P101	Ethyl cyanide	0.24
P123	Toxaphene	0.0095

*These standards are a mixture of grab and composite samples. Each standard is identified as either grab or composite in the tables found at § 268.43.

BASIS OF REVISIONS TO U, P AND F039 WASTEWATER STANDARDS

Regulated organic constituents	Reference for revision
Acetone	1
Acetonitrile	3
Acrolein	3
Acetophenone	1
4-Aminobiphenyl	3
Aramite	1
Benzo(b)fluoranthene	3
Benzo(g,h,i)perylene	3
Bromodichloromethane	3
Bromomethane	3
4-Bromophenyl phenyl ether	3
n-Butyl alcohol	1
Butyl benzyl phthalate	3
2-sec-Butyl-4,6-dinitrophenol	2
Carbon tetrachloride	3
Carbon disulfide	1
p-Chloroaniline	2
Chlorobenzene	3
Chlorobenzilate	3
2-Chloro-1,3-butadiene	3
Chlorodibromomethane	3
bis-(2-Chloroethoxy) methane	1
bis-(2-Chloroethyl) ether	3
2-Chloroethyl vinyl ether	3
bis-(2-Chloroisopropyl) ether	3
p-Chloro-m-cresol	3
2-Chloronaphthalene	3
2-Chlorophenol	3
3-Chloropropene	3
O-Cresol	3
Cresol (m- and p- isomers)	3
Cyclohexanone	1
1,2-Dibromo-3-chloropropane	3
1,2-Dibromoethane	3
Dibromomethane	3
Dibenzo(a,h)anthracene	3
tris-(2,3-Dibromopropyl) phosphate	3
m-Dichlorobenzene	1
o-Dichlorobenzene	3
p-Dichlorobenzene	3
3,3'-Dichlorobenzidine	3
cis-1,4-Dichloro-2-butene	3
trans-1,4-Dichloro-2-butene	3
Dichlorodifluoromethane	3
2,4-Dichlorophenol	3
2,6-Dichlorophenol	3
1,2-Dichloropropane	3
cis-1,3-Dichloropropene	3
trans-1,3-Dichloropropene	3
3,3'-Dimethoxybenzidine	3
p-Dimethylaminoazobenzene	3
1,4-Dinitrobenzene	3
2,4-Dinitrotoluene	3
2,6-Dinitrotoluene	3
Di-n-octyl phthalate	3
Diphenylamine	3
1,2-Diphenyl hydrazine	3
Diphenylnitrosoamine	3
1,4-Dioxane	3
Disulfoton	1
Endrin aldehyde	3
Ethyl acetate	3
Ethyl benzene	3
Ethyl cyanide	3
Ethyl ether	3
Ethyl methacrylate	1
Ethylene oxide	3
Famphur	1
Hexachlorobenzene	3
Hexachlorobutadiene	3
Hexachloroethane	3
Hexachloropropene	3
Indeno(1,2,3,-c,d)pyrene	3
Isobutyl alcohol	1
Isosafrole	2
Kepone	1
Methacrylonitrile	3
Methanol	1
Methapyrilene	2
3-Methylchloanthrene	3
4,4-Methylene-bis-(2-chloroaniline)	3
Methyl ethyl ketone	1
Methyl isobutyl ketone	1
Methyl methacrylate	1
Methyl methanesulfonate	1
2-Naphthylamine	3
p-Nitroaniline	3
5-Nitro-o-toluidine	3
N-Nitrosodiethylamine	3
N-Nitrosodimethylamine	3
N-Nitroso-di-n-butylamine	3
N-Nitrosomethylethylamine	3
N-Nitrosomorpholine	3
N-Nitrosopiperidine	3
N-Nitrosopyrrolidine	3
Pentachlorobenzene	3
Pentachlorodibenzo-furans	1
Pentachloronitrobenzene	3
Pentachlorophenol	3
Phenacetin	2
Phenol	1
Phorate	1
Pronamide	2
Pyridine	3
Safrole	2
1,2,4,5-Tetrachlorobenzene	3
Tetrachlorodibenzo-p-dioxins	1
1,1,1,2-Tetrachloroethane	3
1,1,2,2,-Tetrachloroethane	3
2,3,4,6-Tetrachlorophenol	3
Tribromomethane (bromoform)	3
1,2,4-Trichlorobenzene	3
2,4,5-Trichlorophenol	1
2,4,6-Trichlorophenol	1
1,2,3-Trichloropropane	3
1,1,2-Trichloro-1,2,2-trifluoroethane	3
Xylene(s)	3

Note: This table includes constituents regulated under multi-source leachate that may not be U or P waste codes, or may be U or P wastes which are not being promulgated in today's rule (i.e., Famphur P097 was finalized in the 2nd 3rd Final Rule, January 11, 1989 and is included here only because it is a regulated constituent in multi-source leachate).

References for the basis of the revised standards are as follows:
1—Revisions are based on analysis of treatment data previously submitted for multi-source leachate
2—Revisions are based on analysis of treatment data from EPA's WAO/PACT study for selected U and P chemicals
3—Revisions are based on re-analysis of existing treatment data and comments

(2) *Nonwastewaters.* EPA is promulgating nonwastewater concentration-based standards for the majority of U and P wastes as proposed. All promulgated concentration-based standards reflect the performance of well-designed and well-operated incineration systems and were developed primarily using the results of fourteen incinerator test burns (not to be confused with test burns carried out as part of the RCRA permitting process) which EPA undertook for the development of treatment standards for specific F and K wastes plus selected U and P wastes. The Agency reexamined these data together with other data and comments submitted during the comment period. Based on this re-analysis, the Agency changed the proposed treatment standards for approximately seventy-five constituents. These changes are summarized in the tables at the end of this section.

These changes took the form of either different numerical values for concentration-based standards or promulgating incineration as a method of treatment for wastes for which EPA had proposed concentration-based standards. Where the values of the numerical standard changed, some promulgated standards are lower and some are higher than the proposed standards. In no case, did EPA promulgate a concentration-based standard for a waste code for which a method of treatment was proposed.

In the course of developing the proposed standards, the Agency had examined the logistics of generating incineration data, considering relative availability, expense, and ease for nonwastewater forms of all of these organic U and P waste codes. EPA decided to select a limited number of U and P waste code compounds (representing the various classifications inherent to the structure of these chemicals) for additional testing in two test burns prior to the proposed rule. These new data were used in conjunction with the data from the previous twelve test burns to develop the proposed treatment standards for the remaining untested wastes. The compounds that were tested were selected to represent the treatability of each group of waste codes, based on similarities in chemical structure i.e., presence of key functional groups, elemental composition (including chlorine, sulfur, and nitrogen), number of carbon atoms, arrangement and number of aromatic and aliphatic rings, isomer and homologue series, and degree of chlorination.

The two burns were designed such that the physical forms, concentrations, and soil content of the feed would represent the range of U and P wastes as EPA anticipates they will be generated. The treatability test consisted of two 6-hour burns consisting of 11 liquids and 7 solids. Clean fill (i.e., dirt) was added to produce ash representing that resulting from incineration of a waste spilled on soil. Four sample sets of ash and scrubber water were analyzed for BDAT list constituents. (More information on the test burn can be found in the Onsite Engineering Report Treatment Technology Performance and Operation for John Zink Company, October, 1989).

Through these incineration tests, EPA demonstrated that incineration is BDAT for a wide variety of U and P organic compounds—halogenated, non-halogenated, volatiles, semivolatiles, and pesticides. EPA's evidence for this is that these compounds are present at significant levels in untreated wastes and then appear at or near detection levels in the ash residues from these tests. Thus, data from these incineration tests assumed a critical role in developing concentration-based and technology-based treatment standards for nonwastewaters.

Detection limits represent the lowest values of a contaminant that an analytical measurement procedure can reliably measure in a particular matrix (e.g., incinerator ash). Detection limits are especially significant in developing concentration-based standards based on incinerator performance because a well-designed and well-operated incineration system appears to reduce the concentrations of virtually all of the investigated organic compounds to detection limits. EPA treats the detection limit as the quantitative expression of the post-treatment concentration and therefore calculates concentration-based standards by assuming that the detection limit represents the lowest level to which incineration can lower a contaminant's concentration.

Several sources of data received after the proposed rule was published led EPA to make the changes between the proposed and final rules discussed in the rest of this section. One source was commenters' data, especially the "Interlaboratory Ash Study" discussed in the following section. Another source was an in-house study by EPA's Office of Research and Development pointing out recently discovered major problems in quantifying analytes for which EPA had proposed concentration-based standards. Additionally, EPA reevaluated its own calculations and modified several sets of standards to ensure a consistent methodology.

Comments about the proposed concentration-based standards fell into two groups: comments about treatment standards for individual waste codes and one substantial comment from a group of waste treatment industry representatives dealing primarily with the issue of detection limits in incinerator ash. This comment provided EPA with a significant amount of ash characterization data. Although some aspects of this data were flawed. EPA considered this study carefully when evaluating the standards before promulgation; the Response to Comments Background Document presents EPA's critique of this study's strengths and weaknesses. Subsection (1) of the following discussion of comments presents a detailed discussion of how EPA evaluated this commenter's ash data. Subsection (2) describes all of the changes between the proposed and final standards, and subsection (3) discusses the other significant comments received on the proposed concentration-based standards and analytical issues.

(a) Use of the Interlaboratory Ash Study. One commenter, representing the waste treatment industry, submitted a study undertaken by several laboratories associated with commercial incineration facilities to verify whether industry labs can reliably quantify the regulated constituents at the level of both the proposed and previously promulgated concentration-based standards in incinerator ash. The study's secondary purpose was to identify those regulated constituents for which concentration-based standards may be altogether inappropriate (i.e., inferring that standards expressed as methods are more appropriate). The commenter analyzed many RCRA-regulated constituents, virtually all the organics on the BDAT list, in samples of incinerator ash at levels near the concentration-based standards. These data included six detection limits reported by each of six laboratories representing the average of seven replicate detection limit determinations made on a single sample of ash from a commercial incineration facility.

These data also included six sets of seven spike recoveries reported by the six laboratories—42 recoveries in all for each analyte. (Recoveries represent the

fraction of a known quantity of the compound in question added to a sample and then measured (i.e., recovered) in subsequent analysis.)

EPA evaluated the commenter's detection limit and recovery data for each regulated organic constituent by first comparing these detection levels to those obtained by EPA during its various test burns. For most of these, the commenter's detection levels fell within an order of magnitude of EPA's detection levels. As a result, EPA did not raise concentration-based standards for those analytes where the commenter's detection limits fell very close to those EPA achieved.

Consequently, EPA made several sets of changes between the proposed and final standards following analysis of this commenter's data. These changes primarily occurred when EPA reevaluated cases where the commenter reported higher detection limits than EPA used to calculate standards. Although EPA had generally used the highest of the set of up to fourteen incinerator ash concentrations as the basis of the Third Third proposed standards for many compounds, some exceptions were made in the case of apparent outliers and where EPA believed a particular raw waste matrix best represented the waste in question.

Most of the changes in the numerical values between proposal and promulgation arose from an EPA reevaluation of the use of recovery factors in calculating concentration-based standards. EPA had calculated the proposed concentration-based standards for halogenated aliphatics, aromatics and polynuclear aromatics using an average recovery factor of several compounds. However, concentration-based standards for the rest of these wastes were calculated using a recovery factor from a single compound, not the average of several compounds. To ensure consistency among all concentration-based standards, EPA chose to recalculate standards for halogenated aliphatics, aromatics and polynuclear aromatics using a single compound recovery factor. The following compounds were affected:

1. Halogenated aliphatics: U044, chloroform; U076, 1,1-dichloroethane; U077, 1,2-dichloroethane; U078, 1,1-dichloroethylene; U079, trans-1,2-dichloroethylene; U080, methylene chloride; U083, 1,2-dichloropropane; U084, cis-1,3-dichloropropene; U084, trans-1,3-dichloropropene; U131, hexachloroethane; U208, 1,1,1,2-tetrachloroethane; U209, 1,1,2,2-tetrachloroethane; U210, tetrachloroethylene; U211, carbon tetrachloride; U226, 1,1,1-trichloroethane; U227, 1,1,2-trichloroethane; and U243, hexachloropropene. The proposed standard for U228, trichloroethylene had been calculated using single-compound recoveries and therefore did not need to be recalculated.

2. Aromatics: U239, total xylenes. The proposed standards for U019, benzene and U220, toluene; U239, had been calculated using single-compound recoveries and therefore did not need to be recalculated.

3. Polynuclear aromatics: U005, 2-acetylaminofluorene; U018, benzo(a)anthracene; U022, benzo(a)pyrene; U050, chrysene; U063, dibenzo(a,h)anthracene; U120, fluoranthene; U137, indeno(1,2,3-c,d)pyrene; U157, 2-methylchlorolanthrene; U165, naphthalene; U051, naphthalene, pentachlorophenol, phenanthrene, pyrene and total xylenes. The proposed standard for U051, toluene had been calculated using single-compound recoveries and therefore did not need to be recalculated.

A second set of changes to numerical values resulted from EPA's decision not to base concentration-based standards for U and P nonwastewaters on data from three of the fourteen test burns and to recalculate the concentration-based standards with data from the other test burns involving matrices more similar to U and P matrices. These burns incinerated K011, K013 and K014, acrylonitrile-cyanide wastes; K024, phthalic anhydride wastes and K037 disulfoton (an organophosphate pesticide) wastes. EPA's reason for excluding these burns from the database for U and P nonwastewater is that each of these waste matrices has a relatively unique composition in terms of including very few chemical compounds. By contrast, the test burns EPA chose for the promulgated standards, namely those incinerating creosote wastes (K001), ethylene dichloride wastes (K019), and veterinary pharmaceutical wastes (K102), all involved matrices which are both difficult to treat and difficult to analyze. The Background Document for Organic U and P wastes and Multisource Leachate, Volume C, discusses the difference among these waste matrices in more detail. Nonwastewater standards affected by this decision are:

1. Halogenated pesticides and chlorobenzenes: P060, Isodrin; and U142, Kepone.

2. Miscellaneous halogenated organics: U045, chloromethane; U158, 4,4'-methylenebis (2-chloroaniline) and U075, dichlorodifluoromethane.

3. Oxygenated organics: U159, methyl ethyl ketone; U002, acetone; U108, 1,4-dioxane; U112, ethyl acetate; and U117, ethyl ether.

4. Organonitrogens: U009, acrylonitrile; U172, N-nitroso-di-n-butylamine; U179, N-nitrosopiperidine; U180, N-nitropyrrolidine; U181, 5-nitro-o-toluidine.

5. Pharmaceutical wastes: U155, methapyriline.

EPA is promulgating a higher concentration-based standard for U043, vinyl chloride because the commenter's reported detection limits lie well above the detection limits which EPA used to develop concentration-based standards. The promulgated standard for vinyl chloride reflects the choice of a different and higher detection limit from the ethylene chloride (K019) waste matrix.

EPA reevaluated its choice of recovery values for P047, 4,6-dinitro-o-cresol; P048, 2,4-dinitrophenol; U004, acetophenone; and U170, 4-nitrophenol to ensure consistency with the methodology. Therefore the numerical values have changed between proposal and promulgation for these four compounds.

(b) Changes from Concentration-Based Standards to Methods of Treatment as Standards. The rest of the changes consisted of promulgating standards expressed as methods of treatment for U and P wastes for which the Agency had proposed concentration-based standards. For P003, acrolein; U003, acetonitrile; U073, 3,3'-dichlorobenzidine; U038, chlorobenzilate; U168, 2-naphthylamine; U093, p-dimethylaminoazobenzene; and U057, cyclohexanone, the data submitted by a commenter representing the hazardous waste treatment industry reported such drastic detection limit discrepancies or extreme recoveries that EPA believes these analytes belong in the category of those not amenable to quantification. EPA notes that the proposed wastewater standard for P003, acrolein, had been a concentration-based standard while the nonwastewater standard was a method of treatment: promulgated standards for both forms of P003, acrolein, are methods of treatment.

For 2-chloro-1,3 butadiene, a constituent of F039 leachate not regulated as a U or P waste, the commenter reported zero recoveries for several sets of replicates and extremely variable recoveries for another. Based on EPA's own experience in quantifying 2-chloro-1,3 butadiene, the Agency is promulgating a treatment method for 2-chloro-1,3 butadiene rather than a

concentration-based standard as proposed.

For U017, benzal chloride, the Agency solicited comments on data with adequate QA/QC verifying that incineration reduces benzal chloride to detection levels. One commenter suggested that the Agency regulate benzyl alcohol and benzaldehyde, hydrolysis products of benzal chloride, as benzal chloride surrogates. The commenter stated that EPA used surrogates in regulating phthalates in the Second Third rule. However, the Agency believes that this situation is different because there is no way to correlate and codify how well the concentrations of benzyl alcohol and benzylaldehyde in a waste matrix reflect the concentration of benzal chloride, especially in a waste already containing substituted benzenes. Although the commenter did provide EPA with certain limited analytical data demonstrating quantification of benzal chloride with SW-846 method 8015 in a waste stream from a remediation project, the commenter did not characterize the matrix or the treatment process well enough for EPA to set numerical treatment standards for U017. Therefore, since EPA received no specific information demonstrating successful measurement of benzal chloride, EPA is promulgating incineration as a technology-based standard for benzal chloride as U017.

It should be noted that EPA is promulgating, as proposed, the concentration-based standard for benzal chloride as a constituent of K015 nonwastewaters. EPA believes benzal chloride can be quantified in K015 nonwastewaters more easily than in U017 nonwastewaters for the following reasons: EPA's data show that K015 untreated nonwastewaters contain so much benzal chloride (at least 90%) that instability in water does not hinder benzal chloride identification and also that incineration has successfully treated K015 nonwastewaters. However, the composition of any U and P wastes is, by the definition of these wastes, extremely variable, and the benzal chloride composition may very well fall below the level of reliable quantification.

EPA also changed several standards in response to information in a recently released EPA Office of Research and Development (ORD) study, EPA/600/S4-89/010, "USEPA Method Study 36: SW-846 Methods 8270/3510 GC/MS Method for Semivolatile Organics: Capillary Column Technique; Separatory Funnel Liquid-Liquid Extraction". This study evaluates the analytical methods most commonly used to quantify semivolatile analytes, a category of organic chemical including more than half of the compounds regulated in this rule. Although this study was carried out in support of the RCRA ground water monitoring regulations and consequently looked only at aqueous matrices rather than at the incinerator ash matrices used to develop these nonwastewater concentration-based standards, the study documents such serious analytical problems with several Third Thirds analytes that EPA has chosen to promulgate incineration as a treatment standard rather than the proposed concentration-based standards. These analytes are: U197, p-benzoquinone; U132, hexachlorophene; U166, 1,4-naphthoquinone; U167, 1-naphthylamine; P082, N-nitrosodimethylamine; U184, pentachloroethane; and U201, resorcinol plus the leachate components aramite, benzenethiol, phthalic anhydride, dibenzo(a,e)pyrene, tris (2,3-dibromophosphate) and dibenzo(a,i)pyrene.

This study determined how reliably these analytes can be quantified in aqueous matrices by examining the recoveries obtained and the precision achieved over the course of multiple analyses by several laboratories. Statistical analysis indicated that the recovery data for the analytes listed above were so unrealistically high or low that EPA has declined to recommend the use of SW-846 methods 3510/8270 for quantifying these analytes in ground-water monitoring at RCRA-permitted facilities.

In promulgating the Third Third final rule, EPA chose to incorporate this recommendation about the severity of the problems associated with SW-846 methods 3510/8270 and therefore move these analytes into the category of those compounds to be regulated with technology-based standards. The reason for this decision is that the study documents significant problems with GC/MS (gas chromatography/mass spectrometry) which is the technique used almost exclusively to quantify organic compounds in all environmental samples and is the basis not only of SW-846 8270, but for most other SW-846 methods for organic analytes) which are common to most methods used to quantify these compounds.

EPA makes one exception, however, in the case of P020 (Dinoseb), to its decision to promulgate methods as standards for those analytes recommended for deletion from methods 3510 plus 8270 in this ORD study. Since EPA has specific analytical data on the incineration of Dinoseb and since the data was of sufficient QA/QC, EPA is promulgating the concentration-based Dinoseb standards as proposed.

In reviewing its own data, EPA also determined that inadequate documentation exists demonstrating the successful quantification of U074, cis- and trans-1,4-dichloro-2-butene. Considering this together with the problems in quantifying these compounds as a pair because their widely different boiling points complicate their behavior in the GC/MS apparatus, EPA is promulgating incineration as a method rather than the proposed concentration-based standard.

These decisions affect leachate standards as follows:

1. All nonwastewater leachate numbers will change as the concentration-based-standard for that U or P waste constituent changes.

2. Compounds identified in the study as problem analytes by Method 36 will be dropped from the list of wastewater and nonwastewater leachate components, with the exception of P082, N-nitrosodimethylamine, for which the Agency has data indicating that it can be successfully quantified in wastewaters. Consequently EPA is promulgating a concentration-based-standard for P082 wastewaters while promulgating methods of treatment as standards for P082 nonwastewaters.

3. Compounds, namely benzal chloride and 1,4-dichloro-2-butene, for which EPA decided to promulgate methods as standards rather than concentration-based-standards as proposed will be dropped from the list of leachate components.

4. Compounds dropped because the commenter's incinerator ash study identified problems with quantifying them in ash due to questionable detection limits and recovery values will be dropped from the list of leachate nonwastewater components but will remain on the list of leachate wastewater components because the analytical problems identified by the commenter's study apply only to the incinerator ash matrix and not to aqueous matrices from other treatment processes.

(c) Changes and Treatability Groups. EPA received several other comments about the proposed concentration-based-standards for nonwastewaters. The proposed rule described how EPA developed each concentration-based-standard for each waste in a treatability group. Each treatability group section discussed how the chemistry of waste codes compared to a compound incinerated in one of EPA's fourteen test burns. In addition, the proposal solicited

comments on issues specific to that treatability group as a whole (i.e., comments on SO_x controls for the Organosulfur Wastes), or pertinent to individual members of that treatability group (i.e., information on possible methods for benzal chloride analysis in the Miscellaneous Halogenated Organic Wastes section).

Treatability-group oriented information describing how each concentration-based-standard for each U and P waste is presented in the Background Document for Organic U and P wastes and Multisource Leachate, Volume C. The following discussion addresses waste-specific comments, but the previous discussion contains this preamble's primary explanation of those promulgated standards which differ from the proposed standards. Furthermore, those F and K wastes which were grouped with similar U and P wastes are discussed elsewhere in this preamble, in the section identified by the F and K wastes.

The following paragraphs review those treatability-group oriented issues which generated significant comments, especially those for which EPA explicitly solicited comments in the proposed rule. These paragraphs summarize the comments and EPA's response in order to provide the regulated community with a coherent picture of the issues evaluated in developing the promulgated standards rather than to be an exhaustive summary of each decision made for each U and P waste regulated in this group. Such comprehensive summaries appear in the Background Document for Organic U and P wastes and Multisource Leachate, Volumes B and C; these present in detail how EPA developed the proposed standards and then modified them for promulgation in response to information subsequently.

(A) Brominated Organics. In the proposed rule, EPA solicited comment on several process design and air emissions control issues unique to bromine incineration. Issues of particular interest were operating conditions needed to ensure adequate bromine oxidation and the need for air pollution control devices. EPA particularly wanted information indicating whether treatment standards promulgated in this rule should mandate a maximum bromine concentration in the feed to the incinerator and the use of air emissions control devices. The Agency also solicited comment on the appropriateness of biodegradation as BDAT for P017, bromoacetone.

EPA received no substantive comments on the proposed bromine standards. Specifically, commenters did not provide the process design or emissions control information EPA solicited in light of bromine's unique corrosive properties.

Therefore, EPA is promulgating the nonwastewater standards as proposed in the absence of specific comments. EPA continues to believe that combustion of these wastes could pose risks from air emissions at particular facilities. The Agency, however, is unable to resolve these concerns at this time. Since any problem is likely to be site-specific, EPA believes, given our current limitations, that the best way to evaluate and control potential problems with objectionable air emissions from burning brominated wastes is a permit-by-permit approach through the use of the omnibus permit authority in section 3005(c)(3).

(B) Aromatics and Other Hydrocarbons. The only comments received dealt with fuel substitution as an alternate treatment method for those wastes in this group which are not amenable to quantification.

(C) Oxygenated Organics. In the proposed rule, the Agency solicited comments on three sets of issues involving analytical methods: (1) Difficulties the regulated community may have experienced analyzing U031, n-butanol; U112, ethyl acetate; and U117, ethyl ether using methods the Agency only recently authorized; (2) analytical data characterizing attempts to quantify P003, acrolein, since the Agency questioned the acrolein data generated in the fourteen EPA test burns; and (3) data characterizing attempts to quantify methanol in waste matrices, particularly with SW-846 methods. (See 54 FR 48413, November 22, 1989.)

The Agency received no substantive information in response to these requests. Although one commenter submitted analytical data showing that the commenter's system had treated U154, in the commenter's waste stream to low levels, this data could not support a numerical standard for methanol because the commenter's data did not describe the treatment system or the influent waste stream in enough detail to assure the Agency that this system could successfully treat the wide variety of U154 wastes the regulated community must manage. More importantly, the commenter's data did not address the analytical difficulties encountered in quantifying methanol.

Another commenter challenged the Agency's decision to set a treatment method as a standard for U154 rather than to transfer the Solvents Rule methanol number, promulgated in November 1986, to U154. EPA believes that the analytical difficulties associated with quantifying methanol in U and P matrices are significantly more severe than those associated with quantifying methanol in a TCLP extract, as is the basis of the F001–F005 Solvents Rule methanol standards. Therefore, EPA chose incineration and oxidation as methods for methanol in U and P wastes to ensure methanol destruction. Parenthetically, EPA notes that 53 FR 31164 (August 17, 1988) explains how EPA developed the Solvents Rule F001–F005 standards.

(D) Organo-Nitrogen Compounds. In designating incineration as Best Demonstrated Available Technology for organonitrogen wastes, EPA considered defining "BDAT incineration" for organonitrogens as including process controls to minimize No_x emissions.

The proposed rule solicited comment on several air-emission-related technical problems and regulatory issues anticipated to complicate the incineration of organonitrogen wastes (see 54 FR 48417, November 22, 1989). The issues all arise from the corrosive behavior of oxidized nitrogen compounds. EPA specifically solicited comments on three aspects of incinerating organonitrogen wastes: (1) Information on incinerator feed stream concentrations of nitrogen demonstrated to have been successfully incinerated; (2) information on incinerator design and operation—especially air pollution control devices—believed to meet the requirements of the Clean Air Act under Sections 108, 110 and 111 and under the Prevention of Significant Deterioration program's New Source Review, and (3) comments on whether to invoke the omnibus permitting requirements of RCRA (final sentence of section 3005) for units burning these wastes, or alternatively, to prohibit burning these wastes in combustion units without appropriate air pollution controls.

Several commenters urged the Agency to leave responsibility for air quality at hazardous waste treatment facilities to the RCRA permitting process under 40 CFR parts 264 and 270 and consequently not to include air emission controls in the land disposal restriction regulations as part of the definition of the treatment system. EPA received limited data characterizing NO_x generation at several RCRA-permitting test burns incinerating several organonitrogen wastes plus a narrative description of emissions control systems at one of these incinerators. These data showed low NO_x emissions. However, this information was not detailed enough in terms of specifying process design and operation parameter values for the Agency to use in defining BDAT as

incineration plus specified emissions controls for all facilities disposing of organonitrogen wastes.

The RCRA permitting procedure requires Regional or State approval of the entire incinerator system, including process feed as well as air emission control units. Additionally, NO_x emissions are specifically limited under the Clean Air Act stationary source permit requirements. Since both these permits are issued on an individual facility basis, allowing individualized process controls, and since EPA lacks adequate data to dictate realistic NO_x control system design, EPA agrees with the commenters and chooses not to mandate air emission controls for organonitrogen incineration systems. A permit-by-permit determination under the RCRA omnibus authority may be the most appropriate mechanism for providing air emission controls for facilities burning these wastes. (These points by and large apply to proper controls on burning brominated and sulfur-rich wastes as well, and were discussed earlier in this section.) EPA intends to provide guidance to permit writers with respect to facilities burning these wastes.

(E) Organosulfur Wastes. The Agency is promulgating treatment methods as standards for all eighteen organosulfur waste codes as proposed: incineration for organosulfur nonwastewaters, and incineration alone or wet air/chemical oxidation followed by carbon adsorption for organosulfur wastewaters.

Just as for NO_x emission with the organonitrogens category, EPA considered defining "BDAT incineration" for organosulfur as including process controls to minimize SO_x emissions. The proposed rule solicited comment on several potential technical problems and regulatory issues anticipated to complicate the incineration of organosulfur wastes (see 54 FR 48417, November 22, 1989). The issues all arise from the corrosive behavior of oxidized sulfur compounds, some of which are regulated under the Clean Air Act as well as the noxious odors of many of these organic sulfur compounds. EPA specifically solicited comments on three aspects of incinerating organosulfur wastes: (1) Information on incinerator feed stream concentrations of sulfur demonstrated to have been successfully incinerated; (2) information on incinerator design and operation—especially air pollution control devices—believed to meet the requirements of the Clean Air Act under Section 108,110 and 111 and under the Prevention of Significant Deterioration program's New Source Review, and (3) comments on whether to invoke the omnibus permitting requirements of RCRA (final sentence of section 3005) for units burning these wastes, or alternatively, to prohibit burning these wastes in combustion units without appropriate air pollution controls.

As was the case with questions raised in the proposed rule about incineration of organonitrogen wastes and NO_x emisssions, several commenters urged the Agency to leave responsibility for air quality at hazardous waste treatment facilities to the RCRA permitting process under 40 CFR parts 264 and 270 and consequently not to include air emission controls in the land disposal restriction regulations as part of the definition of the treatment system. EPA received no data whatsoever characterizing SO_x emissions or emission control systems.

The RCRA permitting procedure required Regional or State approval of the entire incinerator system, including process feed as well as air emission control units. Additionally SO_x emissions are specifically limited by Clean Air Act stationary source permit requirements. Since both these permits are issued on an individual facility basis, allowing individualized process controls, and since EPA lacks adequate data to dictate realistic SO_x control system design in this reule, EPA agrees with these commenters and chooses not to mandate air emission controls for organosulfur incineration systems. At this time, EPA believes that permit-by-permit determinations under the RCRA omnibus authority are most appropriate for units that may burn these wastes. EPA intends to provide guidance to permit writers with respect to facilities burning these wastes.

EPA proposes treatment technologies as standards for all eighteen of the organosulfur wastes, partly because of the difficulties in analyzing these wastes. One commenter submitted a package of data characterizing both chemical oxidation treatment, namely chlorine dioxide, as well as an analytical method for organosulfur wastes. However, EPA cannot develop numerical treatment standards based on this data because the method does not quantify the individual U and P organosulfur compounds nor does it differentiate regulated from unregulated organosulfur compounds; the commenter's analytical method gives a "total organic sulfur" number which EPA cannot use to develop standards because it gives no indication how much comes from U and P organosulfur wastes in a mixture and how much of this "total organic sulfur" number comes from nontoxic and unregulated organosulfur compounds in the waste stream. Furthermore, the commenter's suggested method, chemical oxidation, is already the treatment method mandated as a standard for organosulfur wastewaters.

(F) Miscellaneous Organic Halogenated Wastes. As it did for Organonitrogen Wastes and Organosulfur Wastes, EPA requested comments on the need for controlling sulfur dioxide emissions in the course of incinerating P026, P118, U020 and U062. As discussed in the section on organosulfur wastes, EPA received no substantive comments on emission controls used in incinerating organosulfur compounds. Although EPA is not building specifying emission control systems into its definition of BDAT for these wastes, EPA intends that the issues of air emissions will be dealt with on a permit-by-permit basis through the section 3005(c)(3) omnibus permits authority.

CHANGES IN CONCENTRATION-BASED STANDARDS FOR U, P, AND F039 NONWASTEWATERS

Code	Constituent	Revised (mg/kg)	Proposed (mg/kg)
047	4,6-Dinitro-o-cresol	160	140
048	2,4-Dinitrophenol	160	140
060	Isodrin	0.066	0.010
002	Acetone	160	0.14
004	Acetophenone	9.7	9.6
005	2-Acetylaminofluroene	140	13
009	Acrylonitrile	84	0.28
018	Benz (a) anthracene	8.2	3.6
022	Benzo (a) pyrene	8.2	3.6
043	Vinyl chloride	33	0.035

CHANGES IN CONCENTRATION-BASED STANDARDS FOR U, P, AND F039 NONWASTEWATERS—Continued

Code	Constituent	Revised (mg/kg)	Proposed (mg/kg)
U044	Chloroform	5.6	6.2
U045	Chloromethane	33	5.6
U050	Chrysene	8.2	3.6
U051	Naphthalene	3.1	1.5
U051	Pentachlorophenol	7.4	7.4
U051	Phenanthrene	3.1	1.5
U051	Pyrene	8.2	1.5
U051	Xylenes (total)	28	33
U063	Dibenz (a,h) anthracene	8.2	13
U075	Dichlorodifluoromethane	7.2	10
U076	1,1-Dichloroethane	7.2	6.2
U077	1,2-Dichloroethane	7.2	6.2
U078	1,1-Dichloroethylene	33	6.2
U079	trans-1,2-Dichloroethylene	33	6.2
U080	Methylene chloride	33	31
U083	1,2-Dichloropropane	18	15
U084	cis-1,3-Dichloropropene	18	15
U084	tans-1,-*Dichloropropene*	18	15
U108	1,4-Dioxane	170	280
U112	Ethyl acetate	33	5.6
U117	Ethyl ether	160	140
U120	Fluoranthene	8.2	3.6
U131	Hexachloroethane	28	30
U137	Indeno (1,2,3-c,d)pyrene	8.2	3.6
U142	Kepone	0.13	0.043
U155	Methapyriline	1.5	0.89
U157	3-Methylcholanthrene	15	33
U158	4,4'-Methylenebis (2-chloroaniline)	35	29
U159	Methyl ethyl ketone	36	200
U165	Naphthalene	3.1	5.9
U170	4-Nitrophenol	29	65
U172	N-Nitroso-di-n-butylamine	17	54
U179	N-Nitroso-piperidine	35	220
U180	N-Nitroso-pyrrolidine	35	220
U181	5-Nitro-o-toluidine	28	56
U208	1,1,1,2-Tetrachloroethane	42	6.2
U209	1,1,2,2-Tetrachloroethane	42	6.2
U210	Tetrachloroethylene	5.6	6.2
U211	Carbon tetrachloride	5.6	6.2
U226	1,1,1-Trichloroethane	5.6	6.2
U227	1,1,2-Trichloroethane	5.6	6.2
U239	Xylenes (total)	28	33
U243	Hexachloropropene	28	37
F039	Disulfoton	6.2	0.1
F039	Famphur	15	0.1
F039	Methyl parathion	4.6	0.1
F039	Parathion	4.6	0.1
F039	Phorate	4.6	0.1
F039	Acenaphthene	4.0	9.1
F039	Anthracene	4.0	7.7
F039	Benzo (ghi) perylene	1.5	1.8
F039	Bromodichloromethane	15	16
F039	Butyl benzyl phthalate	7.9	15
F039	Chlorodibromomethane	15	16
F039	Fluorene	4.0	7.7
F039	Silvex, (2,4,5-TP)	7.9	2.1
F039	2,4,5-T	7.9	2.1
F039	Cyanides (total)	1.8	1.5
F039	Arsenic	5.6	.....
F039	Barium	52	100
F039	Chromium	5.2	5.0
F039	Mercury	0.025	0.2
F039	Selenium	5.7	5.6

Note: The constituents regulated in U or P waste codes are also regulated in F039 nonwastewaters.

CHANGES FROM CONCENTRATION-BASED STANDARDS TO TECHNOLOGY-BASED STANDARDS FOR U AND P NON-WASTEWATERS

Constituent	Revised for codes:
Acetonitrile	U003
Acrolein	P003

CHANGES FROM CONCENTRATION-BASED STANDARDS TO TECHNOLOGY-BASED STANDARDS FOR U AND P NON-WASTEWATERS—Continued

Constituent	Revised for codes:
Benzal chloride	U017
1,4-Dichloro-2-butene (cis and trans)	U074

CHANGES FROM CONCENTRATION-BASED STANDARDS TO TECHNOLOGY-BASED STANDARDS FOR U AND P NON-WASTEWATERS—Continued

Constituent	Revised for codes:
p-Benzoquinone	U197
Chlorobenzilate	U038

CHANGES FROM CONCENTRATION-BASED STANDARDS TO TECHNOLOGY-BASED STANDARDS FOR U AND P NON-WASTEWATERS—Continued

Constituent	Revised for codes:
Cyclohexanone	U057
3,3'-Dichlorobenzidine	U073
p-Dimethylaminoazobenzene	U093
Hexachlorophene	U132
1,4-Naphthoquinone	U166
1-Naphthylamine	U167
2-Naphthylamine	U168
N-Nitrosodimethylamine	U082
Pentachloroethane	U184
Resorcinol	U201

Constituents for which concentration-based standards have been dropped for F039 nonwastewaters

etonitrile
rolein
rylamide
Chloro-1,3-butadiene
-Dichloro-2-butene
amite
nzenethiol
Benzoquinone
nzal chloride
lorobenzilate
clohexanone
enzo (a,e) pyrene
enzo (a,i) pyrene
'-Dichlorobenzidine
Dimethylaminoazobenzene
exachlorophene
-Naphthoquinone
Naphthylamine
Naphthylamine
Nitrosodimethylamine
ntachloroethane
thalic anhydride
sorcinol
Aminobiphenyl
phenylamine
phenylnitrosamine
ethanol
anides (amenable)
allium
s-(2,3-dibromopropyl phosphate)

ONCENTRATION-BASED BDAT TREATMENT STANDARDS FOR U AND P NON-WASTEWATERS

Waste code	Regulated organic constituents	Total composition (mg/kg)
002	Acetone	160
004	Acetophenone	9.7
005	2-Acetylaminofluorene	140
009	Acrylonitrile	84
012	Aniline	14
018	Benz(a)anthracene	8.2
019	Benzene	36
022	Benzo(a)pyrene	8.2
024	bis-(2-Chloroethoxy) methane.	7.2
025	bis-(2-Chloroethyl) ether.	7.2
027	bis-(2-Chloroisopropyl) ether.	7.2
029	Bromomethane	15

CONCENTRATION-BASED BDAT TREATMENT STANDARDS FOR U AND P NON-WASTEWATERS—Continued

Waste code	Regulated organic constituents	Total composition (mg/kg)
U030	4-Bromophenyl phenyl ether.	15
U031	n-Butyl alcohol	2.6
U036	Chlordane, alpha and beta.	0.13
U037	Chlorobenzene	5.7
U039	p-Chloro-m-cresol	14
U043	Vinyl chloride	33
U044	Chloroform	5.6
U045	Chloromethane (methyl chloride).	33
U047	2-Chloronaphthalene	5.6
U048	2-Chlorophenol	5.7
U050	Chrysene	8.2
U051	Lead (measured in mg/l in TCLP extract).	0.51
U051	Napthalene	3.1
U051	Pentachlorophenol	7.4
U051	Phenanthrene	3.1
U051	Pyrene	8.2
U051	Toluene	28
U051	Xylenes	28
U052	o-Cresol	5.6
U052	Cresol (m- and p-isomers).	3.2
U060	o,p'-DDD	0.087
U060	p,p'-DDD	0.087
U061	o,p'-DDD	0.087
U061	p,p'-DDD	0.087
U061	o,p'-DDE	0.087
U061	p,p'-DDE	0.087
U061	o,p'-DDT	0.087
U061	p,p'-DDT	0.087
U063	Dibenzo(a,h)anthracene	8.2
U066	1,2-Dibromo-3-chloropropane.	15
U067	1,2-Dibromoethane	15
U068	Dibromomethane	15
U070	o-Dichlorobenzene	6.2
U071	m-Dichlorobenzene	6.2
U072	p-Dichlorobenzene	6.2
U075	Dichlorodifluoromethane.	7.2
U076	1,1-Dichloroethane	7.2
U077	1,2-Dichloroethane	7.2
U078	1,1-Dichloroethylene	33
U079	trans-1,2-Dichloroethene.	33
U080	Methylene chloride	33
U081	2,4-Dichlorophenol	14
U082	2,6-Dichlorophenol	14
U083	1,2-Dichloropropane	18
U084	cis-1,3-Dichloropropene	18
U084	trans-1,3-Dichloropropene.	18
U101	2,4-Dimethyl phenol	14
U105	2,4-Dinitrotoluene	140
U106	2,6-Dinitrotoluene	28
U108	1,4-Dioxane	170
U111	Di-n-propylnitrosoamine	14
U112	Ethyl acetate	33
U117	Ethyl ether	160
U118	Ethyl methacrylate	160
U120	Fluoranthene	8.2
U121	Trichloromonofluoromethane.	33
U127	Hexachlorobenzene	37
U128	Hexachlorobutadiene	28
U129	alpha-BHC	0.066
U129	beta-BHC	0.066
U129	delta-BHC	0.068
U129	gamma-BHC	0.066
U130	Hexachlorocyclopentadiene.	4.8
U131	Hexachloroethane	28

CONCENTRATION-BASED BDAT TREATMENT STANDARDS FOR U AND P NON-WASTEWATERS—Continued

Waste code	Regulated organic constituents	Total composition (mg/kg)
U137	Indeno(1,2,3,-c,d)pyrene.	8.2
U138	Iodomethane	65
U140	Isobutyl alcohol	170
U141	Isosafrole	2.6
U142	Kepone	0.13
U152	Methacrylonitrile	84
U155	Methapyrilene	1.5
U157	3-Methylchloanthrene	15
U158	4,4-Methylene-bis-(2-chloroaniline).	35
U159	Methyl ethyl ketone	36
U161	Methyl isobutyl ketone	33
U162	Methyl methacrylate	160
U165	Naphthalene	3.1
U169	Nitrobenzene	14
U170	4-Nitrophenol	29
U172	N-Nitroso-di-n-butylamine.	17
U174	N-Nitrosodiethylamine	28
U179	N-Nitrosopiperidine	35
U180	N-Nitrosopyrrolidine	35
U181	5-Nitro-o-toluidine	28
U183	Pentachlorobenzene	37
U185	Pentachloronitrobenzene.	4.8
U187	Phenacetin	16
U188	Phenol	6.2
U192	Pronamide	1.5
U196	Pyridine	16
U203	Safrole	22
U207	1,2,4,5-Tetrachlorobenzene.	19
U208	1,1,1,2-Tetrachloroethane.	42
U209	1,1,2,2-Tetrachloroethane.	42
U210	Tetrachloroethene	5.6
U211	Carbon tetrachloride	5.6
U220	Toluene	28
U225	Tribromomethane (bromoform).	15
U226	1,1,1-Trichloroethane	5.6
U227	1,1,2-Trichloroethane	5.6
U228	Trichloroethene	5.6
U239	Xylene(s)	28
U240	2,4-Dichlorophenoxyacetic acid.	10
U243	Hexachloropropene	28
U247	Methoxychlor	0.18
P004	Aldrin	0.066
P020	2-sec-Butyl-4,6-dinitrophenol.	2.5
P024	p-Chloroaniline	16
P037	Dieldrin	0.13
P047	4,6-Dinitro-p-cresol	160
P048	2,4-Dinitrophenol	160
P050	Endosulfan I	0.066
P050	Endosulfan II	0.13
P050	Endosulfan sulfate	0.13
P051	Endrin	0.13
P051	Endrin aldehyde	0.13
P059	Heptachlor	0.066
P059	Heptachlor epoxide	0.066
P060	Isodrin	0.066
P077	p-Nitroaniline	28
P101	Ethyl cyanide	360
P123	Toxaphene	1.3

b. Technology-based Standards for Specific Organics

As explained in section III.A.1.(h)(2) of the proposed rule (54 FR 48387), the Agency has determined that for many U and P wastes, as well as for some F and K wastes, several complications arise in terms of how reliably the primary hazardous constituents can be quantified. These complications formed the basis of the Agency's decision to promulgate technology-based BDAT treatment standards (i.e., a method (or methods) of treatment) rather than concentration-based constituent specific standards for these wastes.

The proposed rule set methods of treatment as standards for a significant fraction of Third Third U and P wastes. In the course of evaluating information received since the publication of the proposed rule, information coming both from comments about the proposed rule and from internal EPA studies and reviews, EPA is promulgating methods of treatment as the final treatment standard for U and P wastes for which EPA has proposed concentration-based standards. The reasons for this set of changes are discussed in section III.A.5.(a). Since the standards had originally been proposed as concentration-based standards, the section on nonwastewaters with concentration-based-standards is the appropriate place to discuss these.

In developing treatment standards for the proposed rule, EPA found that for any particular hazardous constituent, there are four categories of quantification complications: (1) There are no methods, such as one in SW-846, that are currently verified for the quantification of the constituent of interest in treatment residuals; (2) calibration reagents (i.e., standard solutions of known purity for validating compliance with QA/QC procedures) of that chemical are not currently available on the commercial market; (3) the chemical is unstable in water and immediately hydrolyses into a different entity (i.e., it reacts with water); and (4) the U or P waste is not specifically listed as a single chemical entity (e.g. P030 is listed as "soluble cyanide salts, not otherwise specified"). Chemical specific complications were presented in the appropriate section of the proposed rule preamble that discussed the specific treatability group where the U or P chemical has been classified.

The information EPA received after the proposed rule did not invalidate this scheme for classifying analytical problems, but it did add compounds into the categories of "problem analytes" listed above which EPA had previously considered amenable to quantification. The main reason is that incinerator ash is a more problematic matrix for quantification of organic analytes than EPA had realized; elemental carbon and silicon in ash absorb organic constituents and bind them onto the ash particle so that their true concentration cannot be determined by instrumental analyses.

The Agency is promulgating certain methods of treatment as the treatment standard for many U and P wastewaters and nonwastewaters. Generally, for U and P nonwastewaters, this process is relatively easy because incineration processes are relatively indiscriminate in the destruction of organics due to the high temperatures, efficient mixing, and consistent residence times available from a well-designed and well-operated incinerator. However, in the case of wastewater treatment technologies, there are more chemical specific factors to consider such as: water solubility, instability, molecular size, volatility, elemental composition, and polarity of the specific chemical that is to be treated. Other waste characteristics will also effect the efficiency of treatment such as: total organic carbon, oil and greases, total dissolved solids, total suspended solids, pH, and alkalinity/acidity.

(1) *Nonwastewaters.* The Agency is promulgating the proposed technology-based standards, namely, incineration as a method of treatment, for the organic U and P wastes determined to be unquantifiable as proposed. Additionally, for those unquantifiable U and P wastes containing only carbon, hydrogen or oxygen, EPA is promulgating fuel substitution as an alternative to incineration. In the previous section of the preamble, the Agency identified additional U and P wastes for which the proposed concentration-based standards have been changed to technology-based standards (i.e., incineration). The technology has not changed, but the number of wastes to be regulated with incineration, or fuel substitution where appropriate as a method has increased.

The Agency received numerous comments requesting that the methods proposed as the treatment standard include fuel substitution as a method of treatment. Commenters noted that many organic U and P wastes in the "not amenable to quantification category", such as cumene, have significant energy recovery value and are thus blended for fuel substitution. One commenter further stated that without this change in the standard, these wastes would require incineration at a much greater expense. The commenter urged the Agency to allow fuel substitution for several particularly flammable waste streams which had been mixed with other wastes and comprised less than ten percent of the resulting mixture. The ten percent cutoff was intended to prevent the generation of acid combustion products.

The Agency agrees to allow fuel substitution as a treatment method for wastes not amenable to quantification which contain only carbon, hydrogen or oxygen in their molecular structure. In terms of the treatability groups identified in the proposed rule, this means fuel substitution is promulgated here as an alternative method for these groups: all "Aromatics and Other Hydrocarbons", all "Polynuclear Aromatics", all "Oxygenated Hydrocarbons and Heterocyclics" and those "Pharmaceutical" and "Phenolic" compounds which do not contain molecular constituents other than carbon, hydrogen or oxygen.

The Agency notes that this final rule sets fuel substitution as an alternative method for a larger set of wastes than did the proposed rule; fuel substitution was proposed as an alternative to incineration for "Oxygenated Hydrocarbons and Heterocyclics" alone. Additionally, several wastes in these treatability groups have been added to the category of wastes not amenable to quantification since the proposed rule and thus fuel substitution and incineration is being promulgated as a standard for these wastes for which the Agency had proposed concentration-based standards. These wastes are: U057, cyclohexanone; U166, 1,4-naphthoquinone; U197, p-benzoquinone; and U201, resorcinol.

In other words, EPA bans fuel substitution as an alternative to incineration for all unquantifiable U and P wastes which contain halogens, sulfur or nitrogen. Eliminating these wastes removes the potential for unregulated SO_x, NO_x or halogen emissions from boilers or other thermal combustion facilities not yet regulated as types of treatment units under 40 CFR 264. EPA believes that wastes without halogens, sulfur or nitrogen can be treated by fuel substitution as well as by incineration because the aromatic and aliphatic (both saturated and unsaturated) components of these wastes are typically used as fuel because of their high heating value; and the oxygenated and phenolic components are already partially oxidized.

To summarize the promulgated rule for nonwastewater forms of U and P wastes no amenable to quantification:

EPA is promulgating "Incineration (INCIN) as the Method of Treatment" for those organic U and P wastes containing nitrogen, phosphorous, sulfur, chlorine, bromine or fluorine in their molecular structure and "Incineration (INCIN) or Fuel Substitution (FSUBS) as a Method of Treatment" for those organic U and P wastes containing only carbon, hydrogen and oxygen in their molecular structure. See 40 CFR 268.42 Table 1 for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

Incineration as a method of treatment for nonwastewater forms of:
02—1-Acetyl 2-thiourea
07—Muscimol (5-Aminoethyl 3-isoxazolol)
08—4-Aminopyridine
14—Benzene thiol (Thiophenol)
16—Bis-chloromethyl ether
17—Bromoacetone
18—Brucine
22—Carbon disulfide
23—Chloroacetaldehyde
26—1-(o-Chlorophenyl) thiourea
27—3-Chloropropionitrile
28—Benzyl chloride
34—2-cyclohexyl-4,6-dinitrophenol
42—Epinephrine
45—Thiofanox
46—alpha, alpha-Dimethylphenethylamine
47—4,6-dinitrocresol salts
49—2,4-Dithiobiuret
54—Aziridine
57—2-Fluoroacetamide
58—Fluoroacetic acid, sodium salt
64—Isocyanic acid, ethyl ester
66—Methomyl
67—2-Methylaziridine
69—Methyllactonitrile
70—Aldicarb
72—1-Naphthyl-2-thiourea (Bantu)
75—Nicotine and salts
82—N-Nitrosodimethylamine
84—N-Nitrosomethylvinylamine
93—N-Phenylthiourea
95—Phosgene
08—Strychnine and salts
16—Thiosemicarbazide
18—Trichloromethanethiol
03—Acetonitrile
06—Acetyl Chloride
07—Acrylamide
10—Mitomycin C
11—Amitrole
14—Auramine
15—Azaserine
17—Benzal chloride
20—Benzenesulfonyl Chloride
21—Benzidine
26—Chloronaphazine
33—Carbonyl fluoride
34—Trichloroacetaldehyde
35—Chlorambucil
38—Chlorobenzilate
41—n-Chloro-2,3-epoxypropane
42—2-Chloroethyl vinyl ether
46—Chloromethyl methyl ether

Incineration as a method of treatment for nonwastewater forms of:
U049—4-chloro-o-toluidine hydrochloride
U059—Daunomycin
U062—Diallate
U073—3,3'Dichlorobenzidine
U074—(cis)-1,4-Dichloro-2-butene
U074—(trans)-1,4-Dichloro-2-butene
U091—3,3-Dimethoxybenzidine
U092—Dimethylamine
U093—p-Methylaminoazobenzene
U095—3,3'-Dimethylbenzidine
U097—Dimethylcarbomyl chloride
U110—Dipropylamine
U114—Ethylene bis-dithiocarbamic acid
U116—Ethylene thiourea
U119—Ethyl methane sulfonate
U132—Hexachlorophene
U143—Lasiocarpine
U148—Maleic Hydrazide
U149—Malononitrile
U150—Melphalan
U153—Methanethiol
U156—Methyl chlorocarbonate
U163—N-Methyl N-nitro N-nitroguanidine
U164—Methylthiouracil
U167—1-Naphthylamine
U168—2-Naphthylamine
U171—2-Nitropropane
U173—N-Nitroso-di-n-ethanolamine
U176—N-Nitroso-N-ethylurea
U177—N-Nitroso-N-methylurea
U178—N-Nitroso-N-methylurethane
U184—Pentachloroethane
U191—2-Picoline
U193—1,3-Propane sultone
U194—n-Propylamine
U200—Reserpine
U202—Saccharin and salts
U206—Streptozotocin
U218—Thioacetamide
U219—Thiourea
U222—o-Toluidine hydrochloride
U234—sym-Trinitrobenzene
U236—Trypan Blue
U237—Uracil mustard
U238—Ethyl carbamate
U240—salts and esters of 2,4-D
U244—Thiram

Incineration or fuel substitution as methods of treatment for nonwastewater forms of:
P001—Warfarin (>0.3%)
P003—Acrolein
P005—Allyl alcohol
P088—Endothall
P102—Propargyl alcohol
U001—Acetaldehyde
U008—Acrylic acid
U016—Benz (c) acridine
U053—Crotonaldehyde
U055—Cumene (isopropyl benzene)
U056—Cyclohexane
U057—Cyclohexanone
U064—1,2,7,8-Dibenzopyrene
U085—1,2:3,4-Diepoxybutane
U089—Diethyl stilbestrol
U090—Dihydrosafrole
U094—7,12-Dimethyl benz (a) anthracene
U113—Ethyl acrylate
U122—Formaldehyde
U123—Formic acid

Incineration or fuel substitution as methods of treatment for nonwastewater forms of:
U124—Furan
U125—Furfural
U126—Glycidaldehyde
U147—Maleic anhydride
U154—Methanol
U166—1,4-Naphthoquinone
U182—Paraldehyde
U186—1,3-Pentadiene
U197—p-Benzoquinone
U201—Resorcinol
U213—Tetrahydrofuran
U248—Warfarin (<0.3%)

(2) *Wastewaters.* EPA has typically proposed two alternative methods of treatment as the treatment standard for these U and P wastewater treatability groups. In all cases, the Agency believes that incineration, while not always practical for wastewaters, will provide an efficient destruction of these organic U and P constituents in wastewaters. While the Agency does not want to identify incineration as the primary BDAT treatment technology for these wastewaters, it also does not want to preclude its use. In addition, the Agency does not want to process needless variances for a technology that is recognized to be effective. Therefore, in all cases, "Incineration as a Method of Treatment" is promulgated as one of the alternative treatment standards for wastewater forms of these organic U and P wastes.

However, other oxidation-based treatment technologies are more appropriate than incineration for aqueous waste streams and EPA is promulgating several treatment systems based on oxidation followed by carbon absorption as methods for these wastewaters. The wastewater treatment technology that most closely resembles incineration is wet air oxidation. It is specifically designed to destroy organics in wastewaters and efficiently oxidizes organics in aqueous media by operating at relatively high temperatures and high pressures. Furthermore, wet air oxidation is typically performed on wastewaters that contain relatively high concentrations of organics (i.e., those that are at or near the 1% TOC cut-off for wastewaters). For wastewaters that contain significantly lower concentrations of organics, chemical oxidation typically provides the necessary destruction of organics to levels that can then be adsorbed onto activated carbon (as a mandatory

polishing step). Electrolytic oxidation is also included under chemical oxidation because the process actually performs a form of chemical oxidation induced by electricity and because the Agency has data indicating its effectiveness in destroying cyanides and other organic species with complex bonds.

Since these technologies are known to provide effective treatment for constituents that can be analyzed, the Agency is therefore promulgating oxidation methods followed by carbon adsorption as alternative treatment technologies for most of the organic U and P constituents that requires specified methods of treatment.

None of these technologies have been specifically identified as better than the others due to the current lack of data for those constituents that are difficult to analyze, or for any other surrogate/indicator parameters. However, the Agency is currently investigating the potential use of surrogates/indicators that could be used in future rulemakings to ensure complete destruction and to determine which technology performs best for these U and P constituents in wastewaters.

For quite a few of the organic and some inorganic U and P wastes that require specified methods of treatment, concentration-based treatment standards have not been promulgated because the compounds are relatively unstable in water. This instability implies that they should easily be destroyed with any chemical oxidant (and most probably at ambient temperature and air pressure).

Commenters requested that EPA allow biological treatment for all U and P wastewaters not regulated by numerical standards. EPA rejects the use of biological treatment for any of the U and P wastes which cannot be analytically quantified. Because influent concentrations of these compounds cannot be measured, the treatment unit operators cannot control the levels of these compounds reaching the working organisms in the biological treatment unit, or document that the wastes are effectively biodegraded. The risk of sending unmeasurable quantities of these wastes to a biological treatment unit includes the possibility of shock loads that would disable the plant's working organisms, and allowing these wastes to exit untreated in the effluent until the biological treatment system could be restored to working order.

Even the presence of an activated carbon unit downstream from the biological treatment unit, an option EPA had proposed, might not prevent high concentrations of the shock load components from passing through the entire treatment system with essentially no treatment. A shock load high enough in organic components could push the activated carbon unit to breakthrough, sending the shock load components untreated to land disposal.

Consequently, EPA is precluding the use of biological treatment as a sole mechanism to achieve compliance with BDAT. Biotreatment that is performed in units prior to the use of a BDAT technology or in otherwise exempted units is not precluded from use by these regulations.

Commenters suggested that EPA drop the requirement that activated carbon follow chemical/wet air oxidation or biological treatment. EPA believes that the promulgated treatment standard option of oxidation, electrolytic, chemical or wet-air, followed by activated carbon is superior to the commenters' suggestions because oxidation is more rugged than biotreatment: less easily disabled by a refractory influent stream and more easily restored to working order than a biological treatment unit. As discussed in the proposed rule, wet-air oxidation is most appropriate for those wastewaters near the wastewater cutoff level (i.e. 1% TOC), while chemical oxidation effectively treats those wastes with lower percentages of TOC. EPA's decision to require activated carbon following the oxidation step ensures a backup system to compensate for the uncertainty about final effluent concentrations of these U and P wastes inherent in any process treating unquantifiable wastes. Most importantly, however, since spent activated carbon from treating these wastewaters becomes a nonwastewater form of these wastes (54 FR 48384), and thus must be incinerated according to the promulgated nonwastewater standard, requiring activated carbon treatment ensures that both wastewater and nonwastewater forms of these wastes go to incineration, a method demonstrated to successfully treat a wide variety of organic wastes.

EPA's response to commenters stating that requiring both oxidation and carbon absorption for these U and P wastewaters puts an arbitrary and heavy burden on those generators who had been using biological treatment alone or other simple methods of pre-disposal treatment is that the volume of these wastes generated is small enough that arranging for the promulgated treatment process does not pose an undue burden. Furthermore, some of these wastes are sufficiently refractory that the oxidation-carbon adsorption sequence is necessary to ensure consistent and complete treatment.

In the proposed rule, EPA also solicited data demonstrating the feasibility of regulating TOC or COD (chemical oxygen demand) as a surrogate for these U and P wastewaters: By setting a concentration-based limit on the TOC or COD level of a waste to be land-disposed, EPA would necessarily limit the concentration of a organic toxic materials in that waste. Commenters objected to this proposed practice as unrealistic. No information was submitted demonstrating that TOC or COD could be reliable surrogates for these unquantifiable organic compounds. Consequently, EPA is not promulgating the use of TOC or COD as surrogates.

One commenter objected to the method-based standard requiring activated carbon following biological treatment; the commenter reported that his plant routinely sent pharmaceutical wastes to the facility's in-plant industrial waste treatment plant and stated that the activated-carbon requirement was superfluous. EPA has removed the biological-treatment option for wastewater forms of wastes not amenable to quantification and explains this decision, including the requirement that the spent activated carbon be incinerated, in the section III.a.5.a.(3).

For wastewater forms of organic U and P wastes not amenable to quantification: EPA is promulgating "Incineration (INCIN) as the Method of Treatment" or, alternatively, "Chemical oxidation (CHOXD) or wet-air oxidation (WETOX) followed by carbon adsorption (CARBN)." See 40 CFR 268.42 Table 1 for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

(Wet air oxidation or chemical oxidation), followed by carbon adsorption; or incineration as methods of treatment for wastewater forms of:
P001—Warfarin (>0.3%)
P002—1-Acetyl 2-thiourea
P003—Acrolein
P005—Allyl alcohol
P007—Muscimol (5-Aminoethyl 3-isoxazolol)
P008—4-Aminopyridine
P014—Benzene thiol (Thiophenol)
P016—Bis-chloromethyl ether
P017—Bromoacetone
P018—Brucine

(Wet air oxidation or chemical oxidation), followed by carbon adsorption; or incineration as methods of treatment for wastewater forms of:

P023—Chloroacetaldehyde
P026—1-(o-Chlorophenyl) thiourea
P027—3-Chloropropionitrile
P028—Benzyl chloride
P034—2-cyclohexyl-4,6-dinitrophenol
P042—Epinephrine
P045—Thiofanox
P046—alpha, alpha-Dimethylphenethylamine
P047—4,6-dinitrocresol salts
P049—2,4-Dithiobiuret
P054—Aziridine
P057—2-Fluoroacetamide
P058—Fluoracetic acid, sodium salt
P064—Isocyanic acid, ethyl ester
P066—Methomyl
P067—2-Methylaziridine
P069—Methyllactonitrile
P070—Aldicarb
P072—1-Naphthyl-2-thiourea (Bantu)
P075—Nicotine and salts
P084—N-Nitrosomethylvinylamine
P088—Endothall
P093—N-Phenylthiourea
P095—Phosgene
P102—Propargyl alcohol
P108—Strychnine and salts
P116—Thiosemicarbazide
P118—Trichloromethanethiol
P121—Acetaldehyde
P126—Acetyl Chloride
P127—Acrylamide
P128—Acrylic acid
P130—Mitomycin C
P131—Amitrole
P134—Auramine
P135—Azaserine
P136—Benz(c)acridine
P137—Benzal chloride
P140—Benzenesulfonyl chloride
P141—Benzidine
P146—Chloronaphazine
P153—Carbonyl fluoride
P154—Trichloroacetaldehyde
P155—Chlorambucil
P161—n-Chloro-2,3-epoxypropane
P162—2-Chloroethyl vinyl ether
P166—Chloromethyl methyl ether
P179—4-Chloro-o-toluidine hydrochloride
P183—Crotonaldehyde
P185—Cumene (isopropyl benzene)
P186—Cyclohexane
P189—Daunomycin
P192—Diallate
P194—1,2,7,8-Dibenzopyrene
P193—3,3'Dichlorobenzidine
P194—1,4-Dichloro-2-butene
P195—1,2:3,4-Diepoxybutane
P199—Diethyl stilbestrol
P200—Dihydrosafrole
P201—3,3-Dimethoxybenzidine
P202—Dimethylamine
P204—7,12-Dimethyl benz(a)anthracene
P205—3,3'-Dimethylbenzidine
P207—Dimethylcarbomyl chloride
P210—Dipropylamine
P213—Ethyl acrylate
P214—Ethylene bis-dithiocarbamic acid
P216—Ethylene thiourea

(Wet air oxidation or chemical oxidation), followed by carbon adsorption; or incineration as methods of treatment for wastewater forms of:

U119—Ethyl methane sulfonate
U122—Formaldehyde
U123—Formic acid
U124—Furan
U125—Furfural
U126—Glycidaldehyde
U132—Hexachlorophenene
U143—Lasiocarpine
U147—Maleic anhydride
U148—Maleic Hydrazide
U149—Malononitrile
U150—Melphalan
U153—Methane thiol
U154—Methanol
U156—Methyl chlorocarbonate
U163—N-Methyl N-nitro N-nitroguanidine
U164—Methylthiouracil
U166—1,4-Naphthoquinone
U167—1-Naphthylamine
U171—2-Nitropropane
U173—N-Nitroso-di-n-ethanolamine
U176—N-Nitroso-N-ethylurea
U177—N-Nitroso-N-methylurea
U178—N-Nitroso-N-methylurethane
U182—Paraldehyde
U184—Pentachloroethane
U186—1,3-Pentadiene
U184—Pentachloroethane
U191—2-Picoline
U193—1,3-Propane sultone
U194—n-Propylamine
U197—p-Benzoquinone
U200—Reserpine
U201—Resorcinol
U202—Saccharin and salts
U206—Streptozotocin
U213—Tetrahydrofuran
U218—Thioacetamide
U219—Thiourea
U222—o-Toluidine hydrochloride
U234—sym-Trinitrobenzene
U236—Trypan Blue
U237—Uracil mustard
U238—Ethyl carbamate
U240—salts and esters of 2,4-D
U244—Thiram
U248—Warfarin (<3%)

c. U and P Wastes That are Potentially Reactive

These wastes were grouped together because they are either highly reactive or explosive, or they are polymers that tend to be highly reactive. These wastes pose a significant risk during handling due to their reactivity; this is reflected in the fact that there are no standard SW-846 methods for analyzing reactivity. Because of the difficulties in handling and analyzing these wastes, the Agency is promulgating treatment standards expressed as required methods of treatment (thus eliminating the need to analyze treatment residues).

The Agency investigated several options for developing treatment standards for these wastes, including incineration, chemical oxidation and chemical reduction. Most of these wastes are curently managed by incineration. Other wastes included in this group can be recovered or recycled.

For the purpose of BDAT determinations, the Agency has identified four subcategories according to similarities in treatment, chemical composition, and structure. These groups are: (1) Incinerable Reactive Organics and Hydrazine Derivatives; (2) Incinerable Inorganics; (3) Fluorine Compounds; and, (4) Recoverable Metallics. The discussion of the treatment standards applicable to each subcategory are as follows.

(1) *Incinerable Reactive Organics and Hydrazine Derivatives.*

P009—Ammonium picrate
P081—Nitroglycerin
P112—Tetranitromethane
U023—Benzotrichloride
U096—a, a-Dimethyl benzyl hydroperoxide
U103—Dimethyl sulfate
U160—Methyl ethyl ketone peroxide
P068—Methyl hydrazine
P105—Sodium azide
U086—N, N-Diethylhydrazine
U098—1, 1-Dimethylhydrazine
U099—1, 2-Dimethylhydrazine
U109—1, 2-Diphenylhydrazine
U133—Hydrazine

EPA has grouped these wastes into a treatability group together because they contain no metal constituents and have high inherent fuel values. Consequently, because of the similar characteristics, these wastes can be treated with the same technologies.

The Agency does not believe, however, that concentration-based treatment standards can be established for these wastes at this time. The major problems in establishing concentration-based standards for these wastes are: (1) EPA does not currently have an analytical method for measuring many of these wastes in treatment residues; and (2) where the Agency does have methods, there are no data available on the treatment of these chemicals. In cases when there is no verified analytical method for a particular waste, EPA tries to find an appropriate measurable surrogate or indicator compound; however, no constituent has been identified in these wastes that could be used as a surrogate or indicator compound. (See section III.A.1.h.(2) for a detailed discussion of analytical problems.)

One of the specific problems encountered in analysis of P068, P105, P112, U023, U098, U099, and U103 is that these wastes break down quickly in water (hydrolyze) and that the analysis of wastewater forms of these wastes is very difficult as well as often hazardous due to the intensity of the reaction. See further discussion on the impact of instability in water on the development of treatment standards in section

III.A.1.h.(2.)(c.) of today's notice. In addition, the Agency lacks data on what effects the hydrolysis products would have on the environment. Besides, verified analytical methods do not currently exist for the quantification of these hydrolysis products in treatment residues.

Another analytical problem is created because P081 wastes are only quantifiable by HPLC methods (Note: EPA rejects HPLC methods for waste treatment residual matrices for reasons discussed in section III.A.1.h.(2.)(a.).) In addition, there are no verified SW-846 analytical methods for measuring P009 and U133 in treatment residues.

These analytical problems preclude setting concentration-based treatment standards; consequently, the Agency proposed "Thermal Destruction" (e.g., incineration) as a required method of treatment for the nonwastewater forms of these U and P wastes (54 FR 48427). The Agency, however, reconsidered the treatment technologies applicable for treatment of wastes in this treatability group as a result of information in the comments.

EPA continues to believe that incineration is an applicable technology because data indicate that most of of these wastes are currently incinerated by commercial, as well as military facilities. Additionally, since most these wastes have high Btu values, EPA also believes that these wastes (e.g., hydrazine is used in rocket fuel) are excellent candidates for fuel substitution. Nevertheless, the Agency has also determined that these wastes can be chemically deactivated using chemical oxidation and chemical reduction technologies.

Based on all the available information, the Agency is promulgating "Incineration (INCIN), Fuel Substitution (FSUBS), Chemical Oxidation (CHOXD), or Chemical Reduction (CHRED) as Methods of Treatment" for P009, P068, P081, P105, P112, U023, U086, U096, U098, U099, U103, U109, U133 and U160 nonwastewaters. See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

The Agency proposed "Incineration or Carbon Adsorption" as required methods of treatment for the wastewater forms of this treatability group. During the comment period, EPA received information about the treatment capabilities of other technologies and reevaluated the technologies applicable for treatment of wastewaters in this treatability group.

EPA still believes that incineration is applicable because it will destroy the constituents present in the wastewaters. Carbon adsorption is also applicable because wastewater forms of these wastes can easily be adsorbed due to the branched and ionic nature of their structures. (It should be noted that after adsorption (and before disposal) the contaminated carbon must be treated in compliance with the treatment standard for nonwastewaters.) However, data has also been provided that indicate that some of these wastewaters (i.e., P068) can be treated by ozone/ultraviolet light oxidation; hence, the Agency believes that chemical oxidation and chemical reduction to be applicable technologies for destruction of the constituents in these waste streams. EPA also has information indicating that biodegradation is capable of destroying the compounds in wastewater forms of this treatability group.

The Agency believes all the above mentioned applicable technologies are demonstrated and available hence, "best". Therefore, EPA is promulgating "Incineration (INCIN), Chemical Oxidation (CHOXD), Chemical Reduction (CHRED), Carbon Adsorption (CARBN), or Biodegradation (BIODG) as Methods of Treatment" for P009, P068, P081, P105, P112, U023, U086, U096, U098, U099, U103, U109, U133 and U160 wastewaters. See section 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

Although there is an SW-846 method for U109, the Agency is not establishing a numerical standard for this waste since it is very similar to P068, U086, U098, U099, and U133 (all are hydrazine compounds) and it is the Agency's belief that the promulgated methods will provide effective treatment for this waste.

The Agency is unaware of any alternative treatment or recycling technologies that have been examined specifically for these U and P wastes and solicited data and comments on such technologies but received no response on this issue. In any case, the treatment standard does not preclude recycling (provided the recycling is not a use constituting disposal; see § 261.33, first sentence).

BDAT TREATMENT STANDARDS FOR P009, P068, P081, P105, P112, U023, U086, U096, U098, U099, U103, U109, U133, AND U160

[Nonwastewaters]

Incineration (INCIN), fuel substitution (FSUBS), chemical oxidation (CHOXD), or chemical reduction (CHRED) as methods of treatment *

* See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

BDAT TREATMENT STANDARDS FOR P009, P068, P081, P105, P112, U023, U086, U096, U098, U099, U103, U109, U133, AND U160

[Wastewaters]

Incineration (INCIN), chemical oxidation (CHOXD), chemical reduction (CHRED), carbon adsorption (CARBN), or biodegradation (BIODG) as methods of treatment *

* See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

(2) Incinerable Inorganics.

P006—Aluminum phosphide
P096—Phosphine
P122—Zinc phosphide (>10%)
U135—Hydrogen sulfide
U189—Phosphorus sulfide
U249—Zinc phosphide (<10%)

These wastes were grouped together because they consist of compounds containing only inorganics such as sulfur, nitrogen, phosphorous, and metals. Additionally, these compounds are either extremely toxic gases or can generate toxic gases under aqueous conditions. Treatment technologies for these wastes should include equipment to prevent releases of the toxic gases into the environment.

The Agency does not believe that numerical treatment standards can be established for these wastes at this time. The major problem in establishing concentration-based standards for these wastes is that EPA does not currently have an analytical method for measuring these wastes in treatment residues. For example, one of the specific problems encountered in analysis of P006 wastes is that they break down quickly in water (hydrolyze), making the analysis of wastewater forms of these wastes very difficult. In cases when there is no analytical method for a particular waste, EPA tries to find an appropriate measurable surrogate or indicator

compound; however, no constituent has been identified in these wastes that could be used as a surrogate or indicator compound for nonwastewaters. See section III.A.1.h.(2) for a detailed discussion of analytical problems.

Data available at the time of proposal indicated that these wastes were being incinerated by some commercial treatment facilities. Therefore, the Agency proposed a treatment standard of "Thermal Destruction" for the nonwastewater forms of these wastes. EPA has reevaluated the applicable technologies for wastes in this treatability group as a result of information submitted in the comments.

One commenter specifically requested that chemical oxidation be a method of treatment for phosphine gas (P096) and hydrogen sulfide gas (U135). This commenter said that both gases are flammable and toxic to inhalation and can be treated by controlled reaction with aqueous solutions of potassium permanganate. The commenter stated that this treatment allows the margin of safety that venting into an incinerator does not since both gases, when heated, emit highly toxic oxides, either sulfur or POX. The Agency agrees with the commenter that chemical oxidation and chemical reduction technologies are applicable for treatment of wastes in this treatability group.

The Agency continues to believe that incineration can be used to effectively and safely treat these wastes. However, because most of these wastes will contain high concentrations of sulfur and phosphorous when discarded as off-spec products, they will require as part of the treatment the use of air pollution control equipment capable of controlling the emissions of phosphorous and sulfur to acceptable levels (see the discussion of this issue as it relates to organo-nitrogens and organo-sulfur U and P wastes in section III.A.3.g.). EPA does not believe that fuel substitution is applicable for wastes in this treatability group because of the hazards associated with the toxic gases that can be generated.

Based on the information presented above, the Agency is promulgating "Incineration (INCIN), Chemical Oxidation (CHOXD), or Chemical Reduction (CHRED) as Methods of Treatment" for P006, P069, P122, U135, U189, and U249 nonwastewaters. See section 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

For wastewater forms of P006, P096, P122, U135, U189, and U249, the Agency proposed a standard of "Chemical Oxidation Followed by Precipitation as Insoluble Salts". EPA has reconsidered the "insoluble salts" requirement and believes that because most of these P and U wastes are generated in small quantities it places a large burden on treatment facilities treating these wastes by incineration or chemical treatment to require use of chemicals that will precipitate a small portion of their total waste volume to insoluble salts when other chemicals may be more desirable for their specific treatment needs. EPA also believes that the individual facility discharge limits will control releases into the environment of any soluble compounds generated as a result of treating these compounds.

EPA has also reconsidered the technologies proposed as BDAT as a result of information submitted in the comments. One commenter submitted information indicating that incineration is the best treatment for these wastewaters. The Agency does not believe that treatment using technologies that usually require aeration steps such as biodegradation technologies are applicable because of the toxicity of the gases that could be formed during treatment. Additionally, carbon adsorption is not considered applicable technology for inorganic compounds that do not have branched molecular structures. The Agency believes that thermal and chemical destruction technologies such as incineration, chemical oxidation and chemical reduction provide safer and more effective treatment than either biodegradation or carbon adsorption.

The Agency is promulgating a standard of "Incineration (INCIN), Chemical Oxidation (CHOXD), or Chemical Reduction (CHRED) as Methods of Treatment" for P006, P096, P122, U135, U189, U249 wastewaters. See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

The Agency is currently unaware of any alternative treatment or recycling technologies that have been examined specifically for these wastes and solicited data and comments on these, but received no response on this issue. The final rule, in any case, does not preclude recycling (provided the recycling does not involve burning as fuel or is not a use constituting disposal; see § 261.33, first sentence).

BDAT TREATMENT STANDARDS FOR P006, P096, P122, U135, U189, AND U249

[Nonwastewaters and wastewaters]

Incineration (INCIN), chemical oxidation (CHOXD), or chemical reduction (CHRED) as a method of treatment *

* See section 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

(3) *Fluorine Compounds.*

P056—Fluorine
U134—Hydrofluoric Acid

These wastes were grouped together because of their physical form and because they contain fluorine. Both of these chemicals may be generated as gases (although U134 is often generated as an aqueous acid). Both of these chemicals are also highly reactive and highly corrosive.

The Agency proposed a treatment standard of "Solubilization in Water Followed by Precipitation as Calcium Fluoride" as a method for the nonwastewater form of these wastes, based on the chemical properties of aqueous fluoride ions and the insolubility of calcium fluoride. The Agency also proposed recovery as an alternative specified method. The Agency requested comments and data on these options.

EPA has reconsidered the "insoluble salts" requirement and believes that generally P056 and U134 wastes are generated in such small quantities that it places a large burden on treatment facilities treating these wastes by chemical treatment to require use of chemicals that will precipitate a small portion of their total waste volume to insoluble salts when other chemicals may be more desirable for their specific treatment needs. EPA also believes that the individual facility discharge limits for fluoride will control releases into the environment of any soluble compounds generated as a result of treating these compounds. Therefore, the Agency is not finalizing the insoluble salt requirement.

EPA is promulgating "Adsorption (ADGAS) followed by Neutralization (NEUTR) as a Method of Treatment" for P056 nonwastewaters and "Neutralization (NEUTR) or Adsorption (ADGAS) followed by Neutralization (NEUTR) as Methods of Treatment" for U134 nonwastewaters since this waste can exist as an acidic solution or a gas. See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter

technology code in the parentheses. EPA believes "adsorption" instead of "solubilization" better describes the process of releasing a gas into a liquid media and that "neutralization" of the resulting acidic waste allows the regulated community greater flexibility than "precipitation as calcium fluoride". The Agency made this decision as a result of information indicating that most facilities are currently treating gaseous forms of P056 and U134 by reacting the gases with alkaline solution and that it is common practice to neutralize waste hydrofluoric acid (U134).

One commenter said these fluorine compounds are mixed with other wastes requiring incineration and that they can be safely incinerated and that incineration should be an allowed technology. The Agency is not precluding incineration as long as the acid off-gases are scrubbed with alkaline reagents to achieve the treatment standard of "Adsorption (ADGAS) followed by Neutralization (NEUTR)". In this case, the water will act as the adsorbent and the alkaline reagents will neutralize the acidity.

The Agency has collected data for the wastewater forms of these wastes (see BDAT Background Document for Wastewaters Containing BDAT List Constituents in the RCRA Docket). Based on these data, the Agency proposed a concentration-based treatment standard of 35 mg/l fluoride for P056 and U134 wastewaters. This standard is based on the treatment performance of lime precipitation followed by filtration. The Agency received no comments concerning the wastewater standard and is thus, promulgating this standard as proposed.

BDAT TREATMENT STANDARDS FOR P056

[Nonwastewaters]

Adsorption (ADGAS) followed by neutralization (NEUTR) as a method of treatment *	

BDAT TREATMENT STANDARDS FOR U134

[Nonwastewaters]

Neutralization (NEUTR) or adsorption (ADGAS) followed by neutralization (NEUTR) as methods of treatment *	

BDAT TREATMENT STANDARDS FOR P056 AND U134

[Wastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/l)
Fluoride	35

* See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

(4) *Recoverable Metallics.*

P015—Beryllium dust
P073—Nickel carbonyl
P087—Osmium tetroxide

The Agency has identified the wastes in this group as metal wastes that have a high potential for recovery. Because there are so little data on these wastes, characterization is very difficult. All the wastes in this group contain metallic elements (i.e., beryllium, osmium, and nickel) that can be recovered due to their high economic value. Information available to the Agency indicates that recovery of these metallic elements from these wastes is feasible and is currently practiced.

The Agency proposed a standard of "Recovery as a Method of Treatment" for both nonwastewater and wastewater forms of these wastes. At the time of proposal, the Agency was not aware of any treatment alternatives applicable to these wastes and solicited comments and information to help identify alternative treatment.

Several commenters stated that it is inappropriate to establish recovery as the only acceptable treatment method for nickel carbonyl (P073). One commenter generates very small quantities of P073 (typically less than two pounds per year) and said that due to the highly reactive nature of the chemical, long-term storage in order to obtain quantities sufficient to justify recovery either on-site or off-site would present a significant safety hazard. This commenter currently disposes of P073 by oxidation, either thermally in an incinerator, or chemically in a laboratory scale treatment facility followed by stabilization and feels that this is the only safe, economical and environmentally sound treatment method for small quantities of nickel carbonyl.

The Agency agrees that it may not always be practical to recover small quantities of nickel and that oxidation of wastewaters followed by stabilization of nonwastewaters will provide an effective treatment for nickel carbonyl (P073). Since EPA has performance data for chemical treatment of nickel in wastewaters believed to be similar to P073 wastewaters and stabilization data for nickel in nonwastewaters believed to be similar to P073 nonwastewaters, the Agency has decided to develop concentration-based standards for P073 nonwastewaters and wastewaters. EPA is promulgating a concentration-based standard of 0.32 mg/l nickel for P073 nonwastewaters and a concentration-based standard of 0.44 mg/l nickel for P073 wastewaters. This standard will allow generators the flexibility to use any appropriate method of treatment to achieve the numerical standards.

Another commenter stated that it is inappropriate to establish a treatment standard based only on recovery as a method of treatment for beryllium dust (P015) and osmium tetroxide (P087) and suggested that EPA develop quantitative or alternate technology standards. However, the Agency received neither performance data nor information regarding alternate treatment methods for these compounds during the comment period and has no performance data in the BDAT data base to develop concentration-based treatment standards. On the other hand, the Agency did receive a comment from a producer of beryllium and beryllium-containing products which said that although only very small quantities of P015 are generated at any one time, recovery is a viable and preferred treatment method in light of the high economic value of the recovered beryllium. Additionally, the Agency is aware that it is current practice to recover osmium from P087 using bench-scale technologies because of the high economic value of the recovered osmium. Consequently, the Agency believes that recovery is BDAT for P015 and P087 nonwastewaters and wastewaters and is promulgating "Recovery (RMETL or RTHRM) as a Method of Treatment" for all forms of P015 and P087. As noted through the preamble, Congress expressed a strong preference in the land disposal ban legislative history for recovery as opposed to treatment followed by disposal. See, e.g., H.R. Rep. No. 198 at 31. The standard for these wastes is consistent with the Congressional preference.

BDAT TREATMENT STANDARDS FOR P015, AND P087

Recovery (RMETL or RTHRM) as a method of treatment *

* See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.

BDAT TREATMENT STANDARDS FOR P073

[Nonwastewaters]

Regulated constituent	Maximum for any single grab sample, TCLP Leachate (mg/l)
Nickel	0.32

BDAT TREATMENT STANDARDS FOR P073

[Wastewaters]

Regulated constituent	Maximum for any single grab sample, total composition (mg/l)
Nickel	0.44

d. Gases

P076—Nitric oxide
P078—Nitrogen dioxide
U115—Ethylene oxide

These wastes are typically found as gaseous materials when existing at high concentrations. The Agency is promulgating thermal or chemical treatment as a method of treatment for these wastes in contrast to the proposed standard of recovery as a method of treatment. The Agency acknowledges that these wastes are unlikely to exist in any forms amenable to land disposal but is promulgating these standards in the interest of completeness.

In the proposed rule, the Agency solicited information on whether these wastes are actually being land disposed, how such land disposal takes place, whether anyone intends to land dispose of these wastes in the future and any treatability data that may lead to appropriate numerical land-disposal standards for these wastes.

In soliciting comments on appropriate land-disposal standards for wastes in the gaseous form, EPA wanted information about the physical forms other than empty containers these gases take when discarded. 40 CFR 261.7(a)(1)(i) and 40 CFR 261.7(a)(2) state that "a container that has held hazardous waste that is a compressed gas is empty when the pressure in the container approaches atmospheric [pressure]" and "any hazardous waste remaining in an empty container * * * is not subject to regulation under * * * part 268."

Since cylinders depressurized to atmospheric pressure are explicitly defined as non-hazardous waste (assuming the cylinder itself is not hazardous when disposed), the two physical forms in which these three wastes will most likely pose land-disposal problems are damaged cylinders unacceptable for recycling or reuse and rinsewater used to clean such cylinders. Commenters reported that damaged cylinders pose significant risk of explosion and thus are very dangerous to store and handle; furthermore most cylinder-handling firms refuse to take damaged cylinders. Therefore, commenters report they have been expeditiously treating their damaged cylinders on-site on their own initiative and these commenters strongly urged EPA to set as the treatment standard the chemical and thermal treatment currently being used. EPA agrees. Such activities will require permits under subpart X (Miscellaneous Units) of 40 CFR part 264.

One commenter submitted information about an oxidation process that had been used to treat wastewaters high in ethylene oxide. Although the commenter did not provide rigorous enough documentation of his treatment process design and operation and about his analytical procedures for EPA to use his data to calculate concentration-based standards for ethylene oxide, his data nevertheless support EPA's claim that oxidation processes are BDAT for ethylene oxide wastewaters and nonwastewaters.

U115 (ethylene oxide) can be oxidized to carbon dioxide and water so EPA can specify chemical or thermal oxidation for U115 nonwastewaters and incineration or chemical oxidation plus carbon absorption or biological treatment plus carbon absorption for U115 wastewaters.

However, in choosing appropriate treatment methods for the other two gases, EPA confronts the fact that oxidation is inappropriate for P076 (nitric oxide, NO) and P078 (nitrogen dioxide, NO_2) because the resulting oxidation product is the undesirable NO_x equilibrium mixture. Consequently, EPA is promulgating as treatment standards for P076 and P078 a method suggested by one of the commenters: venting into a reducing solution. EPA leaves the means of venting to the treatment facility and requires only that the effluent, gas or washwater, ultimately be sent through a reducing solution to transform NO and NO_2 to N_2 and O_2.

EPA is promulgating "Venting Into a Reducing Medium as the Method of Treatment (ADGAS)" for P076 and P078, nonwastewaters and wastewaters; "Thermal or Chemical Oxidation (INCIN, CHOXD) as a Method of Treatment" for nonwastewater forms of U115 and "Incineration (INCIN) of Chemical (CHOXD) or Wet-Air Oxidation (WETOX) Followed by Carbon Adsorption (CARBN) as Methods of Treatment" for U115 wastewaters.

BDAT TREATMENT STANDARDS FOR P076 AND P078

[Wastewaters and Nonwastewaters]

Venting into a reducing medium (ADGAS) as a method of treatment

BDAT TREATMENT STANDARDS FOR U115

[Nonwastewaters]

Thermal or chemical oxidation (INCIN, CHOXD) as a method of treatment

BDAT TREATMENT STANDARDS FOR U115

[Wastewaters]

Incineration (INCIN) or chemical (CHOXD) or wet air oxidation (WETOX) followed by carbon absorption (CARBN) as a method of treatment

e. U and P Cyanogens

P031—Cyanogen
P033—Cyanogen chloride
U246—Cyanogen bromide

Today's rule promulgates "Chemical Oxidation (CHOXD) (such as alkaline chlorination), Wet Air Oxidation (WETOX), or Incineration (INCIN) as a Method of Treatment" for amenable and total cyanides for P031, P033, and U246. For these wastes, the Agency is promulgating technology-based standards rather than concentration-based standards because of the high toxicity of these wastes. The Agency received no comments on the use of the above methods of treatment for these wastes.

BDAT TREATMENT STANDARDS FOR P031, P033, U246	
[Nonwastewaters and wastewaters]	
Chemical oxidation (CHOXD), wet air oxidation (WETOX), or incineration (INCIN) as a method of treatment [1]	

[1] See § 268.42, Table 1 in today's rule for a detailed description of the technology standard referred by the five letter technology code in the parentheses.

6. Development of Treatment Standards for Multi-Source Leachate

a. Background

In the preamble to the proposed rule (54 FR 48461–48469), EPA summarized its efforts to develop a regime for managing, under the land disposal restrictions program, leachate derived from the disposal of hazardous wastes, and treatment residues derived from treating such leachate. Reiterating briefly, EPA reconsidered the approach it adopted in the First Third final rule for such leachate (53 FR 31146–31150) due to concerns about available treatment capacity and (to a lesser extent) treatability. As a result, on March 7, 1989, EPA changed certain rules pertaining to the modification of permits (54 FR 9596). This was followed on May 2, 1989 by a final rule that rescheduled the prohibition date for most multi-source leachate to that of the Third Third (54 FR 18836). Throughout these changes, however, EPA adhered (and continues to adhere) to the principle that leachate derived from a listed hazardous waste is a hazardous waste, no matter when the listed waste was initially disposed. If such listed waste is a listed solvent, dioxin, or RCRA section 3004(g) waste, the leachate is itself prohibited from land disposal no later than May 8, 1990. These principles have been upheld by the Court of Appeals for the District of Columbia Circuit in *Chemical Waste Management* v. *EPA*, 869 F.2d 1526, 1536, 1536–37 (D.C. Cir. 1989).

b. Final Approach for Regulating Multi-Source Leachate

In developing treatment standards for multi-source leachate and residues from treating such leachate (referred to collectively as "multi-source leachate" throughout this preamble), EPA solicited comment on two options: whether to apply to the multi-source leachate the treatment standards for the wastes from which the leachate is derived, or whether to designate such multi-source leachate as a separate treatability group with a separate treatment standard. EPA has decided to adopt the second approach, which had almost unanimous support in the public comments. In today's final rule, therefore, the Agency is establishing a separate treatability group for multi-source leachate and is giving it the Hazardous Waste No. F039. The Agency is also adopting one set of wastewater and nonwastewater treatment standards consisting of approximately 200 constituents. (As explained in section (4) below, however, the permit writer has the discretion to narrow the number of constituents that must be regularly analyzed and to determine the frequency of testing.) The following sections discuss in greater detail the Agency's final approach for regulating multi-source leachate.

(1) *Definition of Multi-source Leachate.* Leachate is defined in 40 CFR 260.10 as any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste. Leachate that is derived from the treatment, storage, or disposal of listed hazardous wastes is classified as a hazardous waste by virtue of the "derived-from" rule in 40 CFR 261.3(c)(2). Multi-source leachate is leachate that is derived from the treatment, storage or disposal of more than one listed hazardous waste (54 FR 8264; February 27, 1989).

The Agency solicited comment on whether multi-source leachate should be defined as being derived from more than one treatability group instead of from more than one listed hazardous waste. A number of commenters favored the idea of a definition based on more than one treatability group, stating that if the leachate was derived from only a few similar wastes, it would be burdensome to analyze for constituents that would not be present in the originating listed waste. Other commenters, however, stated that such a definition would be unnecessary and confusing to implement. EPA agrees with those commenters that a definition based upon treatability groups would be difficult to implement in this final rule. There is not sufficient time to develop all potential treatability groups, nor to provide public notice necessary to implement the treatability group concept within the time constraints of this final rule. The Agency believes, moreover, that compliance with the multi-source leachate standards need not be overly burdensome due to the flexibility allowed the permit writer (in the facility's waste analysis plan) to determine constituents to monitor and to decide testing frequency (see section (4) below). The Agency, therefore, is defining multi-source leachate as leachate that is derived from more than one listed waste.

There is one definitional clarification to be made pertaining to leachate derived from more than one listed dioxin-containing waste. The Agency requested comments specifically on whether to consider leachate derived exclusively from F020–F023 and F026–F028 dioxin-containing wastes to be single-source leachate. The majority of commenters supported such a classification, therefore, the Agency is adopting this classification in today's rule. These wastes are acute hazardous dioxin wastes (with the exception of F028) subject to special management standards and (as practical matter) special and appropriate public and regulatory scrutiny. The leachate derived from only these hazardous wastes most often will have the same attributes as the underlying wastes (see 54 FR 46482), and thus would require the same scrutiny and should be subject to the same management standards. Therefore, leachate derived exclusively from F020–F023 and F026–F028, and no other listed hazardous wastes, is single-source leachate that is classified as, and must meet the treatment standards for, the underlying waste codes, F020–F023 and F026–F028. Further discussion of this classification is found in section d. below.

(2) *Single Waste Code for Multi-source Leachate.* EPA has decided to establish a separate treatability group for multi-source leachate, and to designate such leachate by its own waste code. Hazardous Waste No. F039.[3] It should be noted, therefore, that when today's rule is effective, a generator does not have the option to continue classifying their multi-source leachate (under the waste code carry-through) as all the listed wastes from which it is derived; multi-source leachate must be classified as F039.

Although there were some commenters who urged the Agency to retain the waste code carry-through approach for multi-source leachate, the Agency is persuaded that if multi-source leachate is to be considered a distinct treatability group (a virtual consensus in the comments), then multi-source leachate should have a separate waste code and separate treatment standards. Not only does this appear to be the only logical result of creating a separate

[3] As was explained in the proposed rule, this does not mean that such waste is newly identified or listed for purposes of RCRA hammers, or other RCRA purposes such as eligibility for interim status. Rather, the Agency is making a bookkeeping change in the way it designates a type of waste that already is listed and identified.

treatability group, but the rules will be easier to implement and enforce if there is a single treatment standard for multi-source leachate rather than the large number of potential treatment standards (depending on the number of wastes from which the leachate is derived), the result of using the alternative waste code carry-through approach. In addition, it would be harder and more confusing to evaluate situations where multi-source leachate also exhibits a hazardous waste characteristic under the waste code carry-through approach (see 54 FR 48464). A further advantage of establishing a separate waste code and separate treatment standards is that assures treatment of all hazardous nstituents that may be present in the ulti-source leachate, a result less rtain under the waste code carry-rough approach. Thus, EPA sees the eatment standards adopted today as mewhat more protective than those at would apply under a waste code rry-through approach.

The Agency is promulgating a eatment standard for multi-source achate that includes concentration-sed standards for virtually the entire t of BDAT constituents. Because ulti-source leachate derives potentially om any and all of the listed hazardous aste, the treatment standard must count for this possibility, and must nsequently include all of the potential nstituents that may be present. (See 268.41(a) where the Agency adopted e same approach for F001–F005 as ell as treatment standards omulgated in this rule for K086 astes.)

The Agency is not saying that all ulti-source leachate contains all of the DAT list constituents; obviously, some achates do not. The Agency recognizes at it is unnecessary and wasteful to onitor constituents that are not esent. Working out which constituents monitor is a site-specific termination, however. The Agency is day promulgating an implementation heme to account for such site-specific terminations. This implementation heme is similar to that used by EPA's fluent Guidelines program, which quires an initial analysis that may clude all toxic organics, followed by bsequent analyses for only those llutants which would reasonably be pected to be present. This plementation scheme is discussed in eater detail in section (4) below.

(3) *Separate Waste Code for Multi-ource Leachate.* As was already entioned, EPA is listing multi-source achate by a separate waste code, azardous Waste No. F039.

Commenters supported this decision on the grounds that multi-source leachate is a distinct type of waste different from the underlying wastes from which it is derived. In addition, they asserted that they will face fewer administrative obstacles, particularly with respect to permit modifications, if multi-source leachate and its treatment residues have a separate waste code. This raises certain issues relating to state authorization and CERCLA reportable quantities that are discussed below.

EPA requested and received comment on whether designating multi-source leachate by a single waste code should be considered a HSWA regulation immediately effective in authorized States. A number of commenters stated that the rule should be considered to be adopted pursuant to HSWA, and thus be effective immediately in all states (RCRA section 3006(g)). EPA agrees with these comments, and has concluded that the designation of multi-source leachate is a HSWA regulation, in that it effectuates the requirements of RCRA section 3004(m) to set treatment standards for prohibited wastes. As was discussed at 54 FR 9606 (March 7, 1989), Class One through Three permit modification procedures are appropriate and will be used by EPA to implement such HSWA requirements in authorized and unauthorized States. Since EPA will be modifying the RCRA permit in order to implement these HSWA requirements, a state may not need to take any action to recognize the effectiveness of the modification.

The Agency has determined that listing multi-source leachate as a separate waste code is indeed more strict than applying the waste-code carry through principal because: (1) Designating multi-source leachate as a separate waste code requires the monitoring and treatment of more BDAT constituents than would be required under the waste-code carry through approach to regulating multi-source leachate; and, (2) standards for dioxins and furans in multi-source leachate wastewaters are more strict than those that have applied under the waste-code carry through approach.

All hazardous wastes listed pursuant to RCRA section 3001, as well as any solid waste that meets one or more of the characteristics of a RCRA hazardous waste (as defined at 40 CFR 261.21–261.24), are hazardous substances as defined at Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended. The CERCLA hazardous substances are listed at 40 CFR 302.4 along with their Reportable Quantities (RQs). CERCLA section 103(a) requires that persons in charge of vessels or facilities from which a hazardous substance has been released in a quantity that is equal to or greater than its RQ immediately notify the National Response Center at (800) 424–8802 or at (202) 426–2675. In addition, section 304 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) requires the owner or operator of a facility to report the release of a CERCLA hazardous substance or an extremely hazardous substance to the appropriate State Emergency Response Commission (SERC) or Local Emergency Planning Committee (LEPC) when the amount released equals or exceeds the RQ for the substance or one pound where no RQ has been set.

Under section 102(b) of CERCLA, all hazardous wastes newly designated under RCRA will have a statutorily imposed RQ of one pound unless and until adjusted by regulation under CERCLA. In order to coordinate the RCRA and CERCLA rule-makings with respect to new waste listings, the Agency today is making final regulatory amendments under CERCLA authority in connection with the listing of EPA Hazardous Waste No. F039. The Agency will designate EPA Hazardous Waste No. F039 as a hazardous substance under Section 102(b) of CERCLA and establish the RQ for EPA Hazardous Waste No. F039 at one pound.

The RQ for this waste stream is based on the RQs of the hazardous constituents of concern identified under RCRA for the waste stream (50 FR 13456, April 4, 1985). Thus, if a newly listed hazardous waste has only one constituent of concern, the waste will have an RQ that is the same as the RQ for the constituent. If, as in this case, the hazardous waste has more than one constituent of concern, the lowest RQ assigned to any of the constituents will be the RQ for the hazardous waste. RQs are set at 1; 10; 100; 1000; and 5000 pounds. EPA Hazardous waste No. F039 contains several constituents that have RQs of one pound (*e.g.*, mercury, dieldrin, vinyl chloride, etc.); therefore, the RQ of this waste is also one pound. The list of hazardous constituents for this waste may be found at 40 CFR 268.43(a), Table CCW. The definition of multi-source leachate, F039, may be found at 40 CFR 261.31.

(4) *Permit modifications and implementation procedures.* It would appear that listing multi-source leachate by a separate waste code necessitates amending many RCRA permits that do not already include a narrative

description for multi-source leachate and multi-source leachate treatment residues. EPA has also concluded that this designation as a single waste code may require some modification to existing permits in order to treat, store, or dispose of the new waste code, and that such modifications are appropriately achieved through the procedures in 40 CFR 270.42(g).[4] These procedures require the submission of a Class 1 modification by the date on which the waste becomes subject to the new requirements (August 8, 1990). The regulations further specify a subsequent submission of a Class 2 or 3 permit modification request, if appropriate. EPA believes that a Class 1 submission is all that is required when a permit is simply being changed by substituting the F039 waste code for the multiple waste codes that are carried through with the leachate. (If a facility wants to make additional operation changes or introduce the leachate into units not previously permitted to manage the waste, then the appropriate modification procedures would apply before the activity can commence.)

As described more fully in section III.G. of this preamble, it will take some time for permit writers to incorporate specific land disposal restriction procedures into waste analysis plans (WAPs) at all facilities. For facilities that already have a permit, a permit modification will be required to incorporate new procedures in the WAP. Some commenters suggested that any changes to the WAP should be treated as a Class 1 modification. Using the existing permit modification regulations in 40 CFR 270.42, one could question whether it is most appropriate to apply the Class 1 procedures (intended for WAP changes to conform with Agency guidance or regulations, as specified in item B(2)(a) of appendix I), or whether the Class 2 process should be used (see item B(2)(b)). Presented with this question, and responding to commenters who desired an expeditious way to address the appropriate F039 waste analysis procedures, the Agency is today establishing a new Class 1 permit modification (with prior approval) for this purpose. (See item B(1)(b) in appendix I to 40 CFR 270.42.) EPA believes that this classification strikes the proper balance between a streamlined mechanism for upgrading the WAP for F039, while maintaining Agency oversight and approval of the proposal change. All persons on the facility mailing list will also be provided with notice that the facility has requested a change to its WAP (see 40 CFR 270.42(a)).

A few commenters suggested that the initial list of constitutents to be analyzed should not be the entire BDAT list, but rather, it should be a list of all the constituents associated with all the hazardous wastes that has been disposed of in the land disposal unit. Commenters suggested this approach is particularly appropriate for non-commercial facilities that have stable and well-defined waste streams that are land disposed. Indeed, such an approach is basically a case of a generator developing waste characterization information based on his knowledge of how the waste—in this case, leachate—was generated. The Agency believes this is a generally valid approach, and may be considered on a site-specific basis. As discussed in more detail in preamble section III.G., however, in most cases there is still a need for corroborative testing.

The Agency believes that in order to assure compliance with the land disposal restrictions, the following procedures should be followed by treatment, storage, and disposal facilities. First, obtain an initial analysis of all regulated constituents in F039. Based on the results of this analysis, and any other information that should be considered, develop a list of constituents to be analyzed on a regular frequency. This testing scheme should be supplemented with perhaps less frequent, broader analyses to make sure that changes in the composition of the leachate are detected.

This approach is suggested pending an opportunity for the Agency to prescribe the appropriate constituents for analysis and testing frequency for the facility. It is therefore recommended that interim status facilities incorporate such an approach into the WAPs that they maintain pursuant to 40 CFR 265.13.

For both permitted and interim status facilities, the Agency retains its authority (particularly where a revised WAP has *not* been Agency-approved) to determine that, based on an inspection or other information, the testing frequencies and/or protocols are inadequate at a particular facility. In such cases, EPA (or an authorized State) may take a number of actions, including, but not limited to, modifying a facility's permit or pursuing an enforcement action.

(5) *Treatment standards for multi-source leachate.* The F039 treatment standard being promulgated today is based on the data used in the development of the proposed standards, as will as on treatability data received just prior to publication of the proposed rule (see 54 FR 84863, referencing these data). Today's promulgated treatment standard regulates the entire BDAT list of constituents. More information on how the standards for each constituent were developed can be found in the Final BDAT Background Document for Organic U and P Wastes and Multi-Source Leachates (F039), available in the RCRA docket.

As was discussed earlier in section (1), some commenters suggested that multi-source leachate constituent standards should be based on treatability groups, so as not to trigger analysis of the whole BDAT list if the leachate was derived from only a few similar wastes. Other commenters suggested that multi-source leachate standards should be facility-specific. The Agency believes there is some merit to the concept of treatability groups for multi-source leachate, and acknowledges the need for site-specific considerations in implementing the treatment standard. However, the Agency believes that one set of wastewater and nonwastewater standards based on the BDAT list, implemented as stated above (with determination of constituents and frequency of monitoring left to the judgement of the permit writer) is a reasonable and appropriate way to regulate multi-source leachate.

Under the BDAT methodology for determining treatment standards, when the Agency does not have data for a constituent, data may be transferred from a structurally similar compound that is harder to treat and likely to be treated by the same technology. Such transfers use as a starting point constituents within the same treatability group. Frequently within a particular treatability group, constituents that can not be adequately analyzed (and for which methods of treatment are established as the treatment standard) are included in addition to those constituents for which numerical treatment standards are set. The constituent from which data are transferred to the other constituents in the treatability group is the surrogate for any constituents in that treatability group that cannot be analyzed. It is EPA's conclusion in the case of multi-source leachate, however, that establishing numerical treatment standards for each BDAT list

[4] EPA reiterates that the designation of the new waste code for multi-source leachate does not mean that such waste is newly identified or listed under RCRA. Rather, because some permits may restrict management to specified waste codes or types of wastes, it is appropriate to treat such modifications as if they were newly listed waste, as the waste code has been newly changed.

constituent obviates the need to specify methods of treatment for any constituent. In other words, the constituents on the BDAT list serve as surrogates for those constituents that may be present in the multi-source leachate that cannot be adequately analyzed. Several comments were received that agreed with this decision.

Most of the multi-source leachate nonwastewater treatment standards are based on a direct transfer of U and P nonwastewater treatment standards. The remaining organic and metal constituent treatment standards for multi-source leachate are based on treatment performance data transferred from D, F, and K wastes. For the most part, these treatment standards were confirmed as being achievable by performance data on the treatment of multi-source leachate that were received just prior to proposal (that were placed in the record for the proposed rule). These data were analyzed by EPA during the comment period, and were available for public comment and reply comment. The majority of these data show no difficulty in achieving the proposed multi-source leachate nonwastewater standards, most of which were based on incineration as BDAT.

There were other data for a small number of constituents, however, that showed difficulty in meeting the proposed standards. For example, the Agency received data just prior to proposal on the treatment of nonwastewater forms of multi-source leachate by sludge drying of a treatment residue from biological treatment. Many of these data supported the proposed standards; however, detection limits reported for some constituents in nonwastewater leachate indicated that treatment standards based on detection limit data from an incinerator ash matrix may not be routinely achievable. Therefore, data from analysis of the leachate matrix were used to calculate today's revised nonwastewater constituent treatment standards for disulfoton, famphur, parathion, phorate and methyl parathion.

Most of the wastewater constituent treatment standards were transferred from treatment data developed for various other EPA regulatory programs, and are based on data from numerous sources. (These data apply to the development of treatment standards for other wastewaters besides multi-source leachate. Further discussion of these data is presented in preamble section II.A.5.) Additional data were reviewed during the comment period, including data from a recently completed EPA study of wastewater treatment by wet air oxidation followed by PACT or activated carbon, as well as additional performance data from the treatment of multi-source leachate wastewaters which were received just prior to publication of the proposed rule. (These data were placed in the record for the proposed rule for public comment.)

Commenters stated that wastewater standards should not be based on wet air oxidation followed by PACT nor on scrubber water constituent concentrations. The commenters recommended that the Agency base the wastewater constituent standards on biological treatment performance data. The Agency agrees with the commenters that treatment standards normally should be based on wastewater treatment data rather than constituent concentrations in incinerator scrubber water. Therefore whenever the biological treatment performance data demonstrated substantial treatment and met BDAT QA/QC requirements, they were used to set today's revised wastewater constituent treatment standards.

Generally, data on wet air oxidation followed by PACT supported the proposed wastewater constituent treatment standards. In addition, most of the treatment data on multi-source leachate wastewaters show no problems achieving the proposed standards. Whenever multi-source leachate treatment data showed difficulty meeting the proposed standard, while at the same time showed substantial treatment of a constituent by a demonstrated, available technology, these data were used in developing today's revised numerical standards. (Details on the development or transfer of these wastewater standards per constituent can be found in the Final BDAT Background Document for Organic U and P Wastes and Multi-Source Leachates (F039), available in the RCRA docket.)

c. Multi-Source Leachate That Exhibits a Characteristic of Hazardous Waste

EPA is not promulgating separate standards for multi-source leachate that exhibits a characteristic of hazardous wastes. By proposing standards for all of the BDAT list constituents, all of the constituents and properties that define any particular characteristic will be addressed. This is consistent with the Agency's resolution of situations where prohibited listed wastes also exhibit a characteristic: the specific treatment standard for the listed waste controls because it is more specific, and in the case of the standard for multi-source leachate, addresses the constituent that causes the waste to exhibit the characteristic. Should multi-source leachate or its treatment residues exhibit a characteristic at the point of disposal, however, it must be treated to meet the treatment standard for that characteristic. Finally, if multi-source leachate simply exhibits a characteristic of hazardous waste without being derived from a listed waste, it is subject to the treatment standard for that characteristic.

d. Multi-Source Leachate Containing Dioxins and Furans

EPA proposed that the waste code carry-through principle should not apply to multi-source leachate derived, in part, from the disposal of listed dioxin-containing wastes. Consequently, the dioxin land disposal prohibition in RCRA section 3004(e) would not apply to such multi-source leachate (albeit the leachate remains within the ambit, at least, of the statutory hard hammer in RCRA section 3004(g)), and application of the management standards for acute hazardous wastes would not apply to multi-source leachate. Rather, EPA proposed to establish treatment standards for dioxins and furans as part of the standards for multi-source leachate (see 54 FR 48464–48465). This proposed approach was based primarily on analytical data demonstrating either non-detectable or very low levels of these constituents are present in the leachate (using analytical methods capable of analyzing orders of magnitude below the standard limit of detection of 1 ppb). *Id.*

All of the comments agreed with the Agency that multi-source leachate should not be classified under a listed dioxin waste code or prohibition. EPA is adopting this position in the final rule for the reasons stated in the proposal. In addition, the Agency notes that by classifying leachate that is derived from the listed dioxin waste codes, and no other hazardous waste, as single source leachate, the Agency is retaining the dioxin classification for the type of leachate most likely to be sufficiently contaminated with dioxins and furans to warrant the special status and scrutiny required for these wastes.

The final issue presented at proposal was whether the treatment standards for multi-source leachate should include a treatment standard for dioxins and furans, or whether a surrogate constituent could indicate treatment of these constitutents. The Agency examined all available multi-source leachate data and was unable to develop an adequate surrogate for dioxin (the Agency's efforts are

documented fully in the Response to BDAT-Related Comments Background Document). The Agency, therefore, is promulgating treatment standards for dioxins and furans in both the wastewater and nonwastewater forms of multi-source leachate.

e. Status of Multi-source Leachate that is Mixed with Other Prohibited Wastes

EPA reiterates that if another prohibited waste is mixed with multi-source leachate, that waste must still meet the treatment standard applicable to that waste. Thus, once the treatment standards for multi-source leachate become effective, if the treatment standard for any constituent in the prohibited waste is stricter than the standard for that constituent in multi-source leachate, then the entire mixture would have to meet that stricter standard (see § 268.41(b)). (Conversely, if the standard for multi-source leachate is stricter than for the non-leachate prohibited waste, the mixture would have to meet the standard for multi-source leachate.) *Id.* EPA is not reopening this 1986 regulation for review, but is restating that rule here in order to make sure that the regulated community realizes that §§ 268.41(b) and 268.43(b) apply.

A number of commenters stated that they would like to combine leachate from various parts of their plant in order to facilitate treatment. As stated in the preamble to the proposed rule (54 FR 48462), single-source leachate (i.e., leachate derived-from only one waste code such as might be expected from a monofill) cannot be combined to create multi-source leachate, and single-source leachate from separate facilities cannot be combined to create multi-source leachate (this is analogous to the principle that one ordinarily cannot dilute to create a new treatability group). The Agency agrees, however, that it is permissible to combine various multi-source leachate streams at one facility in order to facilitate treatment (so long as the treatment does not constitute land disposal).

It should be noted that at least for the short term, the status of mixtures of multi-source leachate and First Third prohibited wastes is controlled by a stay order entered by a panel of the District of Columbia Circuit Court of Appeals. The order states that "as to anything contaminated both by leachate and by other first-third prohibited wastes, the other wastes must, to the extent technically feasible, be treated to the applicable treatment standards. Prohibited wastes intentionally mixed with leachate for the purpose of avoiding applicable treatment standards remain subject to all of the First Third standards." Order of April 24, 1989 in *Chemical Waste Management* v. *EPA*, No. 88-1581.

As explained at 54 FR 26602 (June 23, 1989), EPA views any mixing of prohibited First Third wastes with leachate that occurs after the date of the stay order to be intentional mixing for the purpose of avoiding a First Third rule treatment standard. Certainly, any such mixing that occurs now—over 18 months after adopting the First Third rule—could be avoided and should not insulate the First Third waste from meeting the treatment standards. EPA in fact intends to move jointly with the petitioners in the case to lift this portion of the stay order. Until the order is lifted, however, EPA reiterates that any First Third prohibited waste mixed with multi-source leachate after the date of the stay order remains subject to the First Third treatment standards.

A final issue relating to mixtures is the status of groundwater that is contaminated with multi-source leachate. As EPA stated at proposal, such groundwater/multi-source leachate mixture is a hazardous waste so long as the multi-source leachate is contained in the groundwater (54 FR 48462). (See *Chemical Waste Management* v. *EPA*, 869 F. 2d at 1539-40, upholding the contained-in principle as a reasonable construction of the mixture and derived-from rules.) Thus, so long as the multi-source leachate is contained in the multi-source leachate/groundwater mixture, the mixture ordinarily would be prohibited from land disposal until treated to meet the treatment standards applicable to multi-source leachate. (During the period of a national capacity variance, the multi-source leachate/groundwater mixture would have to be managed in surface impoundments that satisfy the minimum technology standards if the mixture is managed in an impoundment (see § 268.5(h)(2)).)

BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE

[Nonwastewaters]

Regulated organic constituents	Maximum for any single grab sample, total composition (mg/kg)
Acetone	160
Acenaphthalene	3.4
Acenaphthene	4.0
Acetophenone	9.7
2-Acetylaminofluorene	140
Acrylonitrile	84
Aldrin	0.066
Aniline	14
Anthracene	4.0

BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE—Continued

[Nonwastewaters]

Regulated organic constituents	Maximum for any single grab sample, total composition (mg/kg)
Aroclor 1016	0.92
Aroclor 1221	0.92
Aroclor 1232	0.92
Aroclor 1242	0.92
Aroclor 1248	0.92
Aroclor 1254	1.8
Aroclor 1260	1.8
alpha-BHC	0.066
beta-BHC	0.066
delta-BHC	0.066
gamma-BHC	0.066
Benzene	36
Benzo (a) anthracene	8.2
Benzo (b) fluoranthene	3.4
Benzo (k) fluoranthene	3.4
Benzo (g, h, i) perylene	1.5
Benzo (a) pyrene	8.2
Bromodichloromethane	15
Bromoform	15
Bromomethane (methyl bromide)	15
4-Bromophenyl phenyl ether	15
n-Butanol	2.6
Butyl benzyl phthalate	7.9
2-sec-Butyl-4,6-dinitrophenol	2.5
Carbon tetrachloride	5.6
Chlordane	0.13
p-Chloroaniline	16
Chlorobenzene	5.7
Chlorodibromomethane	16
Chloroethane	6.0
bis-(2-Chloroethoxy) methane	7.2
bis-(2-Chloroethyl) ether	7.2
Chloroform	5.6
bis-(2-Chloroisopropyl) ether	7.2
p-Chloro-m-cresol	14
Chloromethane	33
2-Chloronaphthalene	5.6
2-Chlorophenol	5.7
3-Chloropropene	28
Chrysene	8.2
o-Cresol	5.6
Cresol (m- and p- isomers)	3.2
1, 2-Dibromo-3-Chloropropane	15
1, 2-Dibromoethane (Ethylene dibromide)	15
Dibromomethane	15
2, 4-Dichlorophenoxyacetic acid (2, 4-D)	10
o,p'-DDD	0.087
p,p'-DDD	0.087
o,p'-DDE	0.087
p,p'-DDE	0.087
o,p'-DDT	0.087
p,p'-DDT	0.087
Dibenzo(a,h) anthracene	8.2
m-Dichlorobenzene	6.2
o-Dichlorobenzene	6.2
p-Dichlorobenzene	6.2
Dichlorodifluoromethane	7.2
1,1-Dichloroethane	7.2
1,2-Dichloroethane	7.2
1,1-Dichloroethylene	33
trans-1,2-Dichloroethylene	33
2,4-Dichlorophenol	14
2,6-Dichlorophenol	14
1,2-dichloropropane	18
cis-1,3-Dichloropropene	18
trans-1,3-Dichloropropene	18
Dieldrin	0.13
Diethyl phthalate	28
2,4-Dimethyl phenol	14
Dimethyl phthalate	28

BDAT Treatment Standards for Multi-Source Leachate—Continued

[Nonwastewaters]

Regulated organic constituents	Maximum for any single grab sample, total composition (mg/kg)
Di-n-butyl phthalate	28
1,4-Dinitrobenzene	2.3
4,6-Dinitrocresol	160
2,4-Dinitrophenol	160
2,4-Dinitrotoluene	140
2,6-Dinitrotoluene	28
Di-n-octyl phthalate	28
Di-n-propylnitrosoamine	14
1,4-Dioxane	170
Disulfoton	6.2
Endosulfan I	0.066
Endosulfan II	0.13
Endosulfan sulfate	0.13
Endrin	0.13
Endrin Aldehyde	0.13
Ethyl acetate	33
Ethyl benzene	6.0
Ethyl ether	160
bis-(2-Ethylhexyl) phthalate	28
Ethyl methacrylate	160
Famphur	15
Fluoranthene	8.2
Fluorene	4.0
Fluorotrichloromethane	33
Heptachlor	0.066
Heptachlor epoxide	0.066
Hexachlorobenzene	37
Hexachlorobutadiene	28
Hexachlorocyclopentadiene	4.8
Hexachlorodibenzo-furans	0.001
Hexachlorodibenzo-p-dioxins	0.001
Hexachloroethane	28
Hexachloropropene	28
Indeno (1,2,3,-c,d) pyrene	8.2
Iodomethane	65
Isobutanol	170
Isodrin	0.066
Isosafrole	2.6
Kepone	0.13
Methacrylonitrile	84
Methapyrilene	1.5
Methoxychlor	0.18
3-Methylcholanthrene	15
4,4-Methylene-Bis-(2-chloroaniline)	35
Methylene chloride	33
Methyl ethyl ketone	36
Methyl isobutyl ketone	33
Methyl methacrylate	160
Methyl Parathion	4.6
Naphthalene	3.1
p-Nitroaniline	28
Nitrobenzene	14
5-Nitro-o-toluidine	28
4-Nitrophenol	29
N-Nitrosodiethylamine	28
N-Nitroso-di-n-butylamine	17
N-Nitrosomethylethylamine	2.3
N-Nitrosomorpholine	2.3
N-Nitrosopiperidine	35
N-Nitrosopyrrolidine	35
Parathion	4.6
Pentachlorobenzene	37
Pentachlorodibenzo-furans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Pentachloronitrobenzene	4.8
Pentachlorophenol	7.4
Phenacetin	16
Phenanthrene	3.1
Phenol	6.2
Phorate	4.6
Propanenitrile	360
Pronamide	1.5

BDAT Treatment Standards for Multi-Source Leachate—Continued

[Nonwastewaters]

Regulated organic constituents	Maximum for any single grab sample, total composition (mg/kg)
Pyrene	8.2
Pyridine	16
Safrole	22
Silvex (2,4,5-TP)	7.9
2,4,5-T	7.9
1,2,4,5-Tetrachlorobenzene	19
Tetrachlorodibenzo-furans	0.001
Tetrachlorodibenzo-p-dioxins	0.001
1,1,1,2-Tetrachloroethane	42
1,1,2,2-Tetrachloroethane	42
Tetrachloroethylene	5.6
2,3,4,6-Tetrachlorophenol	37
Toluene	28
Toxaphene	1.3
1,2,4-Trichlorobenzene	19
1,1,1-Trichloroethane	5.6
1,1,2-Trichloroethane	5.6
Trichloroethylene	5.6
2,4,5-Trichlorophenol	37
2,4,6-Trichlorophenol	37
1,2,3-Trichloropropane	28
1,1,2-Trichloro-1,2,2-trifluoroethane	28
Vinyl chloride	33
Xylene(s)	28
Cyanides (Total)	1.8
Antimony	[1] 0.23
Arsenic	[1] 5.0 (EP)
Barium	[1] 52
Cadmium	[1] 0.066
Chromium (Total)	[1] 5.2
Lead	[1] 0.51
Mercury	[1] 0.025
Nickel	[1] 0.32
Selenium	[1] 5.7
Silver	[1] 0.072

[1] Maximum for any single grab sample; TCLP (mg/l).

BDAT Treatment Standards for Multi-Source Leachate

[Wastewaters]

Regulated organic and inorganic constituents	Maximum for any 24 hr. composite, total composition (mg/l)
Acetone	0.28
Acenaphthalene	.059
Acenaphthene	.059
Acetonitrile	.17
Acetophenone	.010
2-Acetylaminofluorene	.059
Acrylonitrile	.24
Aldrin	.021
4-Aminobiphenyl	.13
Aniline	.81
Anthracene	.059
Aroclor 1016	.013
Aroclor 1221	.014
Aroclor 1232	.013
Aroclor 1242	.017
Aroclor 1248	.013
Aroclor 1254	.014
Aroclor 1260	.014
alpha-BHC	.00014
beta-BHC	.00014
delta-BHC	.023

BDAT Treatment Standards for Multi-Source Leachate—Continued

[Wastewaters]

Regulated organic and inorganic constituents	Maximum for any 24 hr. composite, total composition (mg/l)
gamma-BHC	.0017
Benzene	.14
Benz (a) anthracene	.059
Benzo (a) pyrene	.061
Benzo (b) fluoranthene	.055
Benzo (g,h,i) perylene	.0055
Benzo (k) fluoranthene	.059
Bromodichloromethane	.35
Bromomethane	.11
4-Bromophenyl phenyl ether	.055
n-Butyl alcohol	5.6
Butyl benzyl phthalate	.017
2-sec-Butyl-4,6-dinitrophenol	.066
Carbon tetrachloride	.057
Carbon disulfide	.014
Chlordane	.0033
p-Chloroaniline	.46
Chlorobenzene	.057
Chlorobenzilate	.10
Chlorodibromomethane	.057
Chloroethane	.27
bis-(2-Chloroethoxy) methane	.036
bis-(2-Chloroethyl) ether	.033
2-Chloroethyl vinyl ether	.057
Chloroform	.046
bis-(2-Chloroisopropyl) ether	.055
p-Chloro-m-cresol	.018
Chloromethane (methyl chloride)	.19
2-Chloronaphthalene	.055
2-Chlorophenol	.044
3-Chloropropene	.036
Chrysene	.059
o-Cresol	.11
Cresol (m- and p- isomers)	.77
Cyclohexanone	.36
1,2-Dibromo-3-chloropropane	.11
1,2-Dibromoethane	.028
Dibromomethane	.11
2,4-Dichlorophenoxyacetic acid	.72
o,p'-DDD	.023
p,p'-DDD	.023
o,p'-DDE	.031
p,p'-DDE	.031
o,p'-DDT	.0039
p,p'-DDT	.0039
Dibenzo (a,h) anthracene	.055
m-Dichlorobenzene	.036
o-Dichlorobenzene	.088
p-Dichlorobenzene	.090
Dichlorodifluoromethane	.23
1,1-Dichloroethane	.059
1,2-Dichloroethane	.21
1,1-Dichloroethylene	.025
trans-1,2-Dichloroethene	.054
2,4-Dichlorophenol	.044
2,6-Dichlorophenol	.044
1,2-Diochloropropane	.85
cis-1,3-Dichloropropene	.036
trans-1,3-Dichloropropene	.036
Dieldrin	.017
Diethyl phthalate	.20
p-Dimethylaminoazobenzene	.13
2,4-Dimethyl phenol	.036
Dimethyl phthalate	.047
Di-n-butyl phthalate	.057
1,4-Dinitrobenzene	.32
4,6-Dinitrocresol	.28
2,4-Dinitrophenol	.12
2,4-Dinitrotoluene	.32
2,6-Dinitrotoluene	.55
Di-n-octyl phthalate	.017
Di-n-propylnitrosoamine	.40

BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE—Continued

[Wastewaters]

Regulated organic and inorganic constituents	Maximum for any 24 hr. composite, total composition (mg/l)
1,2-Diphenyl hydrazine	.087
1,4-Dioxane	.12
Disulfoton	.017
Endosulfan I	.023
Endosulfan II	.029
Endosulfan sulfate	.029
Endrin	.0028
Endrin aldehyde	.025
Ethyl acetate	.34
Ethyl benzene	.057
Ethyl cyanide	.24
Ethyl ether	.12
bis-(2-Ethylhexyl) phthalate	.28
Ethyl methacrylate	.14
Ethylene oxide	.12
Famphur	.017
Fluoranthene	.068
Fluorene	.059
Heptachlor	.0012
Heptachlor epoxide	.016
Hexachlorobenzene	.055
Hexachlorobutadiene	.055
Hexachlorocyclopentadiene	.057
Hexachlorodibenzo-furans	.000063
Hexachlorodibenzo-p-dioxins	.000063
Hexachloroethane	.055
Hexachloropropene	.035
Indeno (1,2,3,-c,d) pyrene	.0055
Iodomethane	.19
Isobutyl alcohol	5.6
Isodrin	.021
Isosafrole	.081
Kepone	.0011
Methacrylonitrile	.24
Methapyrilene	.081
Methoxychlor	.25
3-Methylchloanthrene	.0055
4,4-Methylene-bis-(2-chloroaniline)	.50
Methylene chloride	.089
Methyl ethyl ketone	.28
Methyl isobutyl ketone	.14
Methyl methacrylate	.14
Methyl methansulfonate	.018
Methyl Parathion	.014
Naphthalene	.059
2-Naphthylamine	.52
o-Nitroaniline	.028
Nitrobenzene	.068
5-Nitro-o-toluidine	.32
4-Nitrophenol	.12
N-Nitrosodiethylamine	.40
N-Nitroso-di-n-butylamine	.40
N-Nitrosomethylethylamine	.40
N-Nitrosomorpholine	.40
N-Nitrosopiperidine	.013
N-Nitrosopyrrolidine	.013
Parathion	.017
Pentachlorobenzene	.055
Pentachlorodibenzo-furans	.000035
Pentachlorodibenzo-p-dioxins	.000063
Pentachloronitrobenzene	.055
Pentachlorophenol	.089
Phenacetin	.081
Phenanthrene	.059
Phenol	.039
Phorate	.021
Pronamide	.093
Pyrene	.067
Pyridine	.014
Safrole	.081
Silvex (2,4,5-TP)	72
2,4,5-T	72

BDAT TREATMENT STANDARDS FOR MULTI-SOURCE LEACHATE—Continued

[Wastewaters]

Regulated organic and inorganic constituents	Maximum for any 24 hr. composite, total composition (mg/l)
1,2,4,5-Tetrachlorobenzene	.055
Tetrachlorodibenzo-furans	.000063
Tetrachlorodibenzo-p-dioxins	.000063
2,3,7,8-Tetrachlorodibenzo-p-dioxin	.000063
1,1,1,2-Tetrachloroethane	.057
1,1,2,2-Tetrachloroethane	.057
Tetrachloroethene	.056
2,3,4,6-Tetrachlorophenol	.030
Toluene	.080
Toxaphene	.0095
Tribromomethane (bromoform)	.63
1,2,4-Trichlorobenzene	.055
1,1,1-Trichloroethane	.054
1,1,2-Trichloroethane	.054
Trichloroethene	.054
Trichloromonofluoromethane	.020
2,4,5-Trichlorophenol	.18
2,4,6-Trichlorophenol	.035
1,2,3-Trichloropropane	.85
1,1,2-Trichloro-1,2,2-trifluoroethane	.057
Vinyl chloride	.27
Xylene(s)	.32
Fluoride	35
Sulfide	14
Antimony	1.9
Arsenic	5.0
Barium	1.2
Beryllium	.82
Cadmium	.20
Chromium (Total)	.37
Copper	1.3
Lead	.28
Mercury	.15
Nickel	.55
Selenium	.82
Silver	.29
Vanadium	.042
Zinc	1.0

7. Applicability of Treatment Standards to Soil and Debris

Soil and debris that are contaminated with prohibited wastes are subject to the land disposal restrictions and must meet the treatment standard for the contaminating waste prior to land disposal. The Agency realizes, however, that there are certain problems associated with regulating hazardous wastes in soil and debris matrices. It may be difficult to obtain a representative sample of the waste in order to determine the level of contaminant concentrations in soil and debris. Additionally, there are a wide variety of soil types, and wastes that may be classified as debris that may range in size from clay-sized particles to large contaminated tanks and buildings. Because of such problems, the Agency is preparing a separate rule-making that will establish treatability groups and treatment standards for contaminated soil and debris. Until contaminated soil and debris can be better organized into treatability groups, however, promulgated treatment standards apply. (The Agency is establishing certain debris subcategories in this final rule. See the discussion of treatment standards for certain characteristic metal wastes in section III.A.3.a.)

If the contaminated soil and debris cannot be treated to meet the promulgated treatment standards, alternative treatment standards can be established under a site-specific variance from the treatment standards (see 53 FR 31221, August 17, 1988) or a full-scale variance (40 CFR 268.44). Categorizing such contaminated soil and debris according to type, volume, form, and contaminant concentration poses several problems best resolved on a site-specific basis. In order to be granted a site-specific variance from the treatment standard, the petitioner must demonstrate to the Agency that because the physical (or chemical) properties of the waste differs significantly from the waste analyzed in developing the treatment standard, the waste cannot be treated to specified levels or by the specified methods (see 40 CFR 268.44).

At proposal, EPA solicited comment on the appropriate treatment standard for scrap metal destined for land disposal that is unavoidably contaminated with a listed hazardous waste (54 FR 48469). The problem potentially arises because scrap metal can itself contain the same metallic constitutents present in a listed waste. The Agency proposed that such scrap metal would not have to meet the treatment standard for the listed hazardous waste if it was unavoidably contaminated and the listed waste had been removed by rinsing or other demonstrated decontamination techniques. The Agency also noted the imprecision of these terms and the difficulties in developing an implementable approach. *Id.*

Most commenters supported the Agency's proposal, and some commentes urged the Agency to extend the same concept to other types of debris mixtures. Commenters were not able, however, to find satisfactory answers for the problems that EPA raised at proposal. It also appears that there are only isolated instances of scrap metal destined for land disposal being contaminated unavoidably with listed prohibited hazardous wastes. EPA consequently believes that the best way to deal with this situation at the present time is on an individualized basis through the § 268.44 treatability variance rather than in a general rule. (The Agency believes that one approacn for variance applicants to consider

would be a demonstration that all of the BDAT constitutents not common to both the scrap metal and the listed prohibited waste meet the treatment standards. In addition, it may be possible to remove common constituents to the level found in unadulterated scrap metal. In this way, the applicant could show compliance with as much of the treatment standard for the listed waste as is readily demonstrable.) As the Agency studies the whole issue of treatment standards for debris further, it may prove that such situations can be dealt with by rule, rather than on a case-by-case basis. At present, however, EPA believes that an individualized approach is preferable.

8. Radioactive Mixed Waste

Radioactive mixed wastes are those wastes that satisfy the definition of radioactive waste subject to the Atomic Energy Act (AEA) that 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 waste characteristics identified in subpart C of 40 CFR part 261. On July 3, 1986 (51 FR 4504), EPA determined that the hazardous portions of mixed wastes are subject to the RCRA regulations. This created a dual regulatory framework for mixed waste because the hazardous component is regulated under RCRA, and the radioactive component is regulated under the AEA.

Statutorily and administratively, management of the radioactive component of mixed wastes differs from that of the RCRA hazardous component. Although EPA may develop ambient health and environmental standards for the RCRA hazardous component, the specific standards for radioactive material management developed under the AEA are administered by the Department of Energy (DOE) for government owned facilities, and by the Nuclear Regulatory Commission (NRC) for commercially owned facilities.

Since the hazardous portions of the mixed waste are subject to RCRA, the land disposal restrictions apply to such waste. This means that the RCRA hazardous portion of all mixed waste must meet the appropriate treatment standards for all applicable waste codes before land disposal.

There are a number of potential problems presented by applying the land disposal restrictions to mixed waste relating to technical achievability of all of the proposed standards, as well as to whether treatment standards can be achieved consistently with requirements imposed pursuant to the AEA. These problems may be resolved by establishing specific treatment standards for certain mixed waste, as the Agency has done in this final rule. In addition, site-specific variances from the treatment standard (40 CFR 268.44) may be used to resolve such problems. If the treatment technologies determined to represent BDAT (and used to establish the treatment standards) are "inappropriate" due to the radioactive hazard of a mixed waste (i.e., requiring a different technology design), a demonstration may be made to this effect in a petition to the Agency for a site-specific variance from the promulgated treatment standard. If such a variance is granted, alternative treatment standards would be established (for the mixed waste at the site) that must be met prior to land disposal.

a. Characterization and Industries Affected

Based on information provided by generators of mixed wastes, the majority of mixed wastes can be divided into three categories based on the radioactive component of the waste: (1) Low-level wastes, (2) transuranic (TRU) wastes, and (3) high-level wastes. Low-level wastes include radioactive waste that is not classified as spent fuel from commercial nuclear power plants, or defense high-level radioactive waste from producing weapons. TRU wastes are those wastes containing elements with atomic numbers greater than 92, the atomic number for uranium. These wastes generally pose greater radioactivity hazards than the low-level wastes because they contain long-lived alpha radiation emitters. High-level radioactive wastes are defined as spent fuel from commercial nuclear power plants, and defense high-level radioactive waste from the production of weapons.

Mixed low-level wastes may be generated in several ways. For example, medical diagnostic procedures use scintillation fluids that contain small amounts of radioactivity in toxic organic solvents (e.g., xylene and toluene). These solvents generally pose a greater chemical hazard than does the low-level radioactivity. The principal generators of low-level mixed wastes are nuclear power plants, DOE, academic, and medical institutions.

One commenter submitted a list of substances generated at commercial nuclear power plants that may be classified as low-level mixed wastes. This included a wide variety of liquid organic wastes such as spent solvents containing suspended or dissolved radionuclides, scintillation cocktails, spent freon used for cleaning protective garments, acetone or solvents used for cleaning pipes or other equipment, and still bottoms from the distillation of freon. Also, the list included a wide variety of solid materials such as spent ion-exchange resins (contaminated with various metals), filters used in reclaiming freon, adsorbents, residues from the cleanup of spills, lead shields, lead-lined containers, welding rods, and batteries.

Military weapons production involves the generation of large amounts of wastes that can fall into the low-level and TRU categories of mixed waste. These wastes are similar in form, but TRU waste is considered by government regulators to be more dangerous because of the alpha radiation emitters.

High-level mixed wastes are extremely dangerous to handle due to their high level of radioactivity. The DOE is responsible for the storage and disposal of all the nation's high-level mixed wastes. High-level wastes are defined as the waste resulting from the reprocessing of irradiated fuel rods from commercial and military nuclear reactors. This reprocessing involves the handling of materials that are extremely hot both thermally and radiologically. One of the reprocessing steps involves dissolving the fuel rods in a nitric acid bath so that plutonium-239 and tritium can be recovered. It is the high-level waste generated from this reprocessing that is considered mixed waste and which requires treatment. DOE has indicated that this high-level waste is EP-toxic for several metals, including lead (D008), silver (D011), chromium (D007), barium (D005), and mercury (D009), and may also exhibit the characteristic of corrosivity (D002).

b. Applicable Technologies

The Agency believes that for treatment of metals in low-level mixed wastes and for some TRU mixed wastes containing low radioactive components, chemical precipitation will remove the metals in wastewaters, and stabilization technologies will reduce the leachability of the metal constituents in nonwastewater matrices. These are the same technologies that are applicable to nonradioactive wastes containing metals.

DOE submitted data demonstrating the applicability of stabilization as a treatment technology for the low-level waste fractions that are separated from the high-level waste generated during the reprocessing of fuel rods. As used by one particular facility, a stabilization process called grout stabilization involves blending commercially produced cement-based reagents with

the liquid low-level waste fraction. The material sets up as a solid mass, immobilizing the waste. The performance data indicate that stabilization provides immobilization of the characteristic metal constituents and radioactive contaminants for this low-level radioactive waste, and that it is possible to stabilize the RCRA hazardous portions to meet the treatment levels for the characteristic metals.

For organic low-level mixed wastes, the Agency believes that incineration is an applicable technology for organic compounds in both wastewater and nonwastewater matrices, and that technologies such as carbon adsorption can achieve removal of organics in wastewaters where incineration is not practical. DOE has submitted information indicating that plans are in place to begin incineration of a D001 ignitable liquid mixed waste containing benzene. Incineration is also an applicable technology for D001 Ignitable Liquids Subcategory nonradioactive wastes. Therefore, this particular mixed waste, if incinerated, would meet the treatment standard for D001 Ignitable Liquids Subcategory.

For TRU mixed wastes with considerable radioactive components, and for high-level wastes, EPA believes that vitrification is an applicable technology for treatment of both organic and inorganic constituents. DOE provided information to support that vitrification is an applicable technology for their high-level wastes generated from the reprocessing of fuel rods. Treatment can be accomplished by using either direct vitrification or a more complex treatment process which includes a series of chemical steps that separate the low-level radioactive waste fractions from the high-level radioactive waste. The high-level radioactive portion is then vitrified. When using separation technologies such as precipitation followed by settling or filtration, the bulk of the radioactivity can be incorporated into a high-level liquid waste containing up to 99 percent of the radioactivity of the original irradiated fuel rods. By separating high-level and low-level mixed wastes, the amount of high-level waste that may require vitrification treatment can be reduced.

DOE submitted specific data on how vitrification will be used to treat high-level mixed waste. As used in the facility design, the vitrification process will incorporate the high-level mixed waste into a glass matrix, achieving a reduction in the mobility of its RCRA hazardous and radioactive constituents. The waste will enter the vitrification system as a slurry (i.e., a blend of solid particles in a liquid base). The mixture will be pumped into a glass melter and heated so that the water is evaporated and the solid glass and waste particles melt and blend. After the mixture has been converted into molten glass, it will be poured into protective stainless steel canisters, where it will harden to form borosilicate glass. The canisters will then be capped and decontaminated and a second cap will be welded into place, forming an additional seal.

c. Determination of BDAT for Certain Mixed Wastes

In many cases, current practice or planned treatment will achieve the promulgated treatment standards for the RCRA hazardous wastes. For example, DOE generates radioactive zirconium fines that are pyrophoric under 40 CFR 261.21(a)(2) (i.e., that cause fire through friction). Consequently, the RCRA hazardous portion of this mixed waste is considered a characteristic ignitable waste included under the D001 Reactive Ignitable Subcategory by EPA. The Agency is promulgating "Deactivation as a Method of Treatment" as the treatment standard for D001 Ignitable Reactives Subcategory. The DOE submitted data which indicate that this waste can be stabilized to remove the characteristic, thereby achieving the treatment standard.

(1) *Treatment Standards for Mixed Wastes Not Otherwise Subcategorized.* The Agency is reiterating that as of the effective date of today's rule, all promulgated treatment standards 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. In other words, unless specifically noted in §§ 268.41, 268.42, or 268.43 of today's rule, the standards located in these sections apply to all mixed wastes. (All alternative standards that are specifically discussed later in this section of the preamble that apply only to specific mixed wastes are identified in § 268.42 Table 3 of today's rule.) All handling requirements for radioactive materials set forth by the Nuclear Regulatory Commission must also be met.

(2) *Treatment Standards for Specific High-Level Wastes.* For most characteristic metal wastes, the Agency has determined that conventional stabilization is BDAT, and has developed treatment standards using stabilization performance data. The Agency does not believe, however, that stabilization using cementitious binders is an appropriate treatment for high-level radioactive mixed wastes generated specifically during the reprocessing of fuel rods. Such mixed wastes exhibit the characteristic of toxicity for certain RCRA hazardous metals (lead, chromium, barium, mercury, and silver). While stabilization would reduce the leaching potential of the characteristic metals, it would not provide treatment of the high-level radioactive portion of the mixed waste.

The Agency provided notice in the proposed rule (54 FR 48492) that DOE was providing to the Agency treatment data for mixed waste. These data were received and placed in the docket for the proposed rule and were available during the comment period for notice and public comment. The Agency analyzed these data and performed a subsequent site visit to the vitrification unit to assess the treatment process. Based upon these data and the site visit, the Agency has concluded that vitrification will provide effective immobilization of the inorganic constituents (i.e., both radioactive and RCRA hazardous) in high-level mixed waste generated during the reprocessing of fuel rods. The Agency is hereby specifying that vitrification is BDAT for these wastes.

The Agency lacks, however, performance data upon which to base a concentration-based standard for this mixed waste. Additionally, the Agency believes that the potential hazards associated with exposure to radioactivity during analysis of this high-level mixed waste preclude setting a concentration-based treatment standard. For these reasons, the Agency is promulgating "Vitrification of High Level Radioactive Waste as a Method of Treatment" as the treatment standard for the high-level fraction of the mixed waste generated during the reprocessing of fuel rods exhibiting the characteristics of corrosivity (D002) and toxicity for metals (D004–D011). (See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.)

BDAT TREATMENT STANDARDS FOR D002, D004, D005, D006, D007, D008, D009, D010, AND D011

[Radioactive high-level wastes generated during the reprocessing of fuel rods subcategory]

Vitrification of high-level radioactive waste (HLVIT) as a method of treatment

(3) *Treatment Standards for D008 Radioactive Lead Solids.* The Agency proposed to develop a subcategory within the D008 wastes and to establish separate treatment standards for specific radioactive lead solids (54 FR 48439). These lead solids were proposed to include, but not be limited to, all forms of lead shielding, lead "pigs", and other elemental forms of lead. The proposed treatment standard for these wastes was "Surface Deactivation or Removal of Radioactive Lead Portions Followed by Encapsulation; or Direct Encapsulation as Methods of Treatment."

The Agency received comments requesting that the Agency clarify what would be included in "lead solids" for purposes of meeting this treatment standard. To clarify this point, today's treatment standard applies to all forms of radioactive mixed waste containing elemental lead (including discarded equipment containing elemental lead that served a personnel- or equipment-shielding purpose prior to becoming a RCRA hazardous waste). These lead solids do not include treatment residuals such as hydroxide sludges, other wastewater treatment residuals, or incinerator ash that can undergo conventional pozzolanic stabilization, or do they include organo-lead materials that can be incinerated and then stabilized as ash.

One commenter challenged the Agency's proposed approach, stating that the proposed method that included "Surface Deactivation" was not based on a demonstrated, available technology. The Agency has information indicating that the lead surface of a shield can be decontaminated using a number of commercially available processes. The Agency agrees, however, that these processes have not been adequately investigated to determine which may be considered "demonstrated" or "best". The Agency, therefore, is dropping "Surface Deactivation" from the final treatment standard.

The Agency is today promulgating a treatment standard expressed as a required method of treatment for the radioactive lead solids treatability group: "Macroencapsulation as a Method of Treatment" (MACRO). See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.) Pretreatment practices such as surface decontamination are not precluded by this final rule. Following pretreatment, any nonradioactive lead is subject to the treatment standard for characteristic lead wastes, 5.0 mg/l.

For low-level radioactive wastes containing lead, conventional stabilization technologies generally should not be affected by the presence of radioactive versus nonradioactive lead. As a result, the Agency is not including mixed wastes such as wastewater treatment residues and incinerator ash containing radioactive lead in a separate treatability group, except for the purpose of determining availability of treatment capacity (i.e., stabilization processes for radioactive materials should employ special safety precautions due to the radioactivity).

BDAT TREATMENT STANDARDS FOR D008

[Radioactive Lead Solids [a] Subcategory]

Macroencapsulation (MACRO) of radioactive lead solids as a method of treatment

[a] These lead solids include 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 then stabilized as ash.

(4) *Treatment Standards for Mixed Waste Containing Elemental Mercury.* Elemental mercury is typically found in vacuum pumps and related manometers. In the nuclear industry, this form of mercury has been contaminated with radioactive tritium (a radio-isotope of hydrogen). These wastes are identified as D009 or U151 mixed wastes.

The Agency proposed a treatment standard for radioactive wastes containing elementary mercury expressed as a method of treatment, "Amalgamation with Zinc as a Method of Treatment" (54 FR 48442–48443). A separate treatability group was established because the proposed treatment standard for nonradioactive wastes of this type was "Roasting or Retorting as a Method of Treatment", and the Agency had no information indicating that these processes could separate the mercury from the radioactive material (i.e., tritium). The Agency based its proposed treatment standard for radioactive wastes containing elemental mercury on data involving the application of elemental zinc powder dampened with dilute sulfuric acid (5–10%) to form a mercury amalgam.

The Agency is promulgating this treatment standard as proposed. The Agency is convinced that amalgamation provides significant reduction in the air emissions of mercury, as well as provides a change in mobility from liquid mercury to a paste-like solid, and potentially reduces leachability. In response to comments stating that in addition to zinc, other inorganic reagents such as copper, nickel, gold, and sulfur were effective in forming mercury amalgamations, the required method, "Amalgamation" (AMLGM), may be accomplished using any of these reagents. (See § 268.42 Table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.) Roasting, retorting, or other recovery processes are not precluded from use by this standard as long as all residuals from these recovery processes comply with the amalgamation treatment standard prior to land disposal.

BDAT TREATMENT STANDARDS FOR D009 AND U151

[Radioactive elemental mercury subcategory]

Amalgamation (AMLGM) as a method of treatment

(5) *Treatment Standards for Mercury-Containing Hydraulic Oil Contaminated with Radioactive Materials.* The Agency proposed a treatment standard of "Incineration as a Method of Treatment with Incinerator Residues Meeting 0.2 mg/l" for D009 hydraulic oil contaminated with radioactive materials (54 FR 48443). This treatment standard was based on EPA's determination that a technology applicable to nonradioactive mercury wastes that contain high levels of organics was incineration. No comments were received on the proposed treatment standard. Upon reexamination of the proposed standard, however, the Agency is dropping the requirements that the treatment residues meet a specified level. This is consistent with the general land disposal restrictions policy that treatment residues resulting from the use of a required method of treatment are not required to also meet a concentration-based standard (see section III.A.1.b). Today's final treatment standard for D009 hydraulic oil contaminated with radioactive materials is "Incineration as a Method of Treatment" (INCIN). (See § 268.42 table 1 in today's rule for a detailed description of the technology standard referred to by the five letter technology code in the parentheses.)

BDAT TREATMENT STANDARDS FOR D009 [Mercury-containing hydraulic oil contaminated with radioactive materials subcategory]
Incineration (INCIN) as a method of treatment

9. Alternate Treatment Standards for Lab Packs

a. Background

The Agency received several comments in response to the Second Third proposed rule (54 FR 1056, January 11, 1989) on the regulatory status of lab packs. The commenters stated that lab packs are typically used by industry to dispose of small quantities of commercial chemical products (U and P wastes) and residues from analytical samples. These lab packs may contain hundreds of restricted wastes, and the applicable treatment standards must be achieved for each waste code contained in the lab pack. The commenters stated that these requirements pose an administrative burden that is incommensurate with the amount of waste being land disposed. In the Second Third final rule (54 FR 26594), the Agency restated its position that all restricted wastes placed in lab packs and land disposed must comply with the land disposal restrictions. However, the Agency solicited comments, data and specific suggestions to support treatment options for lab packs. As a result, the Agency proposed alternate treatment standards in the Third Third proposed rule (54 FR 48372, November 22, 1989), which generators would have the option of utilizing in managing "organic" and "inorganic" lab packs. The Agency received numerous comments in response to the proposal, and is today promulgating the alternate treatment standards with some revisions.

b. Alternate Treatment Standards

Many commenters suggested that EPA expand the universe of waste allowed in organic and inorganic lab packs. The Agency agrees with some of the information and suggestions provided by the commenters, and is promulgating revisions to the alternate treatment standards for lab packs in response to these comments. In order to facilitate implementation of the lab pack standards, the Agency is expanding the proposed list of waste codes in appendix IV to part 268 to include certain inorganic and organometallic hazardous wastes. The revised appendix IV includes the following hazardous wastes:

(1) Inorganic;

(2) Organometallic;

(3) Organic;

(4) D003 reactives; and

(5) D002 corrosives.

The Agency is promulgating an alternate treatment standard of incineration as a specified method followed by a requirement to meet the treatment standards for the EP toxic metals included in appendix IV (*i.e.*, D004–D008, and D010–D011; mercury wastes may not be included in appendix IV lab packs). Such lab packs are hereafter referred to as appendix IV lab packs.

The Agency is also revising the proposed appendix V to part 268, which now identifies organic hazardous wastes that can be effectively destroyed by incineration. The Agency is promulgating an alternate standard of incineration for lab packs containing organic hazardous wastes identified in appendix V to part 268, hereafter referred to as appendix V labpacks.

Generators may commingle unregulated (nonhazardous) waste in both appendix IV and appendix V lab packs. Generators may also commingle hazardous wastes that already meet the treatment standards in the appropriate appendix IV or V lab pack.

The Agency believes that the alternate approach being promulgated in today's final rule is broader in scope than the proposed approach and provides substantial administrative relief. It simplifies the management system for these wastes because owners/operators will not be required to analyze the treatment residue for compliance with individual treatment standards, except for the EP toxic metal constituents of organometallic, inorganic, D002 corrosive, and D003 reactive wastes where the waste codes are identified in appendix IV. As explained below, these waste streams must continue to meet all applicable treatment standards for the EP toxic metal constituents.

Generators who wish to use the alternate treatment standards for lab packs must notify the treatment facility in writing of the EPA Hazardous Waste Number(s) for each hazardous waste contained therein. Generators must submit such notices with each shipment of waste. Appendix V organic lab packs treated by the specified technology may be disposed of in subtitle C facilities without further testing or analysis for compliance with part 268. (The Agency reiterates, however, that owners/operators are responsible for determining whether all treatment residuals exhibit one or more of the characteristics of hazardous waste before land disposal, either by waste analysis or knowledge of the waste.)

The Agency notes that the alternate treatment standard is not mandatory, and does not preempt the requirements for lab packs in 40 CFR 264.316 and 265.316. Generators may continue to ship regulated waste that meets all applicable treatment standards to land disposal facilities in accordance with the provisions of these sections. Generators of lab packs who wish to comply with the current implementation of the land disposal restrictions regulatory framework (*i.e.*, waste code carry through) as it applies to lab packs are free to do so. Lab packs containing hazardous wastes other than those specified in appendices IV and V are not eligible for the alternate treatment standards, and must meet the applicable treatment standard for each waste contained in the lab pack.

c. Agency Response To Major Comments

The Agency received numerous public comments on the proposed standards for lab packs. In general, commenters agreed with the proposed approach; however, they provided recommendations for further relief from the administrative and technical requirements for lab packs. The issues raised by commenters are addressed in the preamble and background document to today's final rule.

(1) *Inorganic and Organometallic Lab Packs.* The Agency proposed an alternate treatment standard of stabilization with Portland cement in a 20 percent binder-to-waste ratio (by weight) for lab packs containing certain EP toxic metals. As proposed, the alternate treatment standard was narrowly defined to include only barium, cadmium, trivalent chromium, lead, and silver; therefore, the alternate treatment stardards were applicable primarily to those EP toxic characteristic wastes. Several commenters suggested that the Agency allow disposal of all hazardous and unregulated organic waste amenable to stabilization in inorganic lab packs. Several commenters suggested that EPA establish an alternate treatment standard of incineration followed by stabilization for organometallic wastes (including F and K waste codes for which EPA has promulgated treatment standards for metal constituents). The commenters stated that the organic constituents in these wastes are effectively destroyed by incineration, and stabilization of the remaining ash effectively reduces metals' leachability. The Agency agrees with the commenters

who stated that the alternate standard for inorganic hazardous waste disposed of in lab packs should be expanded, asnd that the treatment train proposed by the commenters may effectively treat certain organometallic wastes. The Agency believes that a more effective approach to managing inorganic and organometallic wastes would allow commingling of these wastes in an "organometallic" or "appendix IV lab pack." The alternate treatment standard of incineration followed by treatment to achieve the treatment standards for the EP toxic metals included in appendix IV will effectively destroy the organics and immobilize the metal constituents. The Agency, therefore, is not promulgating the alternate treatment standard for "inorganic lab packs" as proposed, but rather is promulgating an alternate standard for "organometallic" or "appendix IV lab packs."

The Agency is departing from its proposed approach for inorganic hazardous waste based on concern with specifying stabilization as a treatment standard for metallic waste streams with varying treatability with no requirement for verifying that stabilization of the hazardous constituents was effective. The Agency is also concerned that the proposed standard would create risks to worker health and safety due to the need for removal of inorganic waste from inner containers prior to stabilization with portland cement. Several commenters claimed that such practices result in unnecessary exposure of treatment personnel, and increase the risk of accidents and resulting environmental exposure. The Agency was unaware of these safety and environmental concerns, and does not wish to increase the risks associated with treatment of these wastes.

Several commenters suggested that the Agency allow corrosive (D002) and reactive (D003) wastes in organic lab packs, while others requested that they be allowed in inorganic or organometallic lab packs. The commenters stated that industry experience with these wastes indicates that they can be effectively treated by incineration, and that recovery is not a cost-effective or practical method of treating these wastes. The Agency agrees in part with the commenters. Although Agency data show that some corrosive wastes can be incinerated effectively (54 FR 48422), many of these wastes contain metal constituents that may require further treatment. The Agency is concerned that incineration of metal-bearing wastes without verification may not be protective of human health and the environment. (Where the Agency specifies a technology as the treatment standard, treatment using the specified technology satisfies the land disposal restriction requirements, and analysis of the treatment residues is not required for purposes of complying with part 268.) The Agency, therefore, is prohibiting D002 corrosive and D003 reactive wastes from appendix V lab packs. Rather, the Agency believes that the alternate treatment standard for Appendix IV organometallic lab packs, which requires incinceration and treatment to meet certain EP toxic metal treatment standards, is more appropriate for D002 and D003 wastes because it requires incineration of organic constituents that may interfere with stabilization and verification that treatment of metals has occurred. The Agency, therefore, is including these waste codes in appendix IV to part 268. Generators may dispose of D002 and D003 wastes in an appendix IV (organometallic) lab pack along with other wastes identified in appendix IV, provided that the compatibility standards in §§ 264.316 and 265.316 are met.

The Agency wishes to clarify that where an appendix IV lab pack contains listed hazardous waste with waste code-specific treatment standards for inorganic constituents that are also EP toxic metals (§ 261.24) (within the same lab pack), the waste must be treated, at a minimum, to meet the EP toxic metal treatment standard. For example, an appendix IV lab pack may contain analytical samples of F006 waste (wastewater treatment sludges from electroplating operations) which has waste code-specific treatment standards for cadmium, chromium, lead and silver. These constituents are also EP toxic metals. In comparing the F006 treatment standards with the EP toxic metal treatment standards for these constituents, the F006 treatment standards for cadmium, lead, and silver are lower than their respective EP toxic metal treatment standards, while the F006 treatment standard for chromium is higher. The applicable alternate treatment standards for all of the metal constituents in this hypothetical analytic sample, at a minimum, would be the treatment standards for the EP toxic metals.

The Agency further wishes to clarify that where lab packs are combined with other non-lab pack hazardous wastes prior to or during treatment (e.g., prior to incineration), §§ 268.41 and 268.43(b) require that the entire mixture must be treated to meet the most stringent treatment standards applicable to the wastes included in the mixture. For example, ash residue resulting from the incineration of a lab pack containing an EP toxic characteristic lead waste together with non-lab pack K001 nonwastewaters (bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol), would have overlapping treatment standards for lead: 0.51 mg/l for the K001 nonwastewater, and 5.0 mg/l for the characteristic waste. In this case, the more stringent treatment standard would apply, based on the mixture of the K001 waste with the lab pack containing an EP toxic metal constituent.

(2) *Unregulated (Nonhazardous) Waste.* In the proposed rule, the Agency stated its concern with the effect of unregulated inorganic wastes on treatment of lab pack wastes. Specific data on the type and quantity of unregulated inorganics destined for disposal in "organic" and "inorganic" lab packs were not available; therefore, the Agency was reluctant to allow disposal of these wastes in lab packs where analysis of the treatment residuals was not required.

The Agency received several comments stating that unregulated waste such as glassware is typically disposed of and incinerated with hazardous waste generated by laboratories. The commenters also stated that protective clothing and gear, such as goggles, gloves, aprons, respirator cartridges, and pesticide products are also disposed of in lab packs. The commenters argued that these unregulated wastes should also be allowed in lab packs because their presence does not affect the performance of incineration of hazardous waste.

The Agency also received comments indicating that the excessive cost of lab pack disposal discourages commingling of hazardous and unregulated wastes. Thus, in most cases, disposal of unregulated waste in lab packs is limited to small quantities. The Agency believes that these small quantities can be effectively treated under the alternate treatment standard, and is revising its proposed approach to allow generators to dispose of unregulated waste in appendix IV lab packs.

(3) *Organic Lab Packs.* The Agency proposed to limit the applicability of the alternate treatment standard to organic wastes that have a treatment standard based on the performance of incineration or thermal destruction, or

where incineration only is specified as the treatment standard.

Some commenters stated that there is no sound basis for excluding waste codes that already meet the treatment standards from disposal in their respective lab packs. The Agency is not opposed to extending the alternate standards to such waste, but was unaware that generators disposed of treated waste (or waste that initially meets the treatment standard) in this manner. Numerous commenters have expressed a desire to continue this practice; therefore, the Agency is revising the language in 40 CFR 268.42(c)(1) so that prohibited waste that meets the applicable treatment standards is not precluded from disposal utilizing the alternate treatment standards, provided that each waste code(s) is listed in appendix IV or appendix V, and the waste is disposed of in the appropriate lab pack.

Several commenters stated that incineration (or deactivation by incineration) of small quantities of reactive U and P wastes in lab packs is proven to be safe and effective. The commenters further point to the fact that EPA proposed deactivation, incineration, or thermal treatment for several U and P waste codes that are potentially reactive wastes, but failed to include the applicable waste codes in appendix IV. The Agency agrees with the commenters that small quantities of reactive U and P waste codes as specified in the proposed rule (54 FR 48427–48428) can be safely packaged and incinerated in a lab pack provided that the requirements for incompatible waste in §§ 264.316 and 265.316 are met. The Agency is therefore amending appendices IV and V to include several additional U and P wastes codes. The Agency also is including California list PCBs and dioxin-containing waste (F020–F023, F026–F028) in the lab pack treatability group as proposed, but reiterates that treatment of these wastes requires more stringent performance standards than wastes included in part 268 appendices IV and V (i.e., dioxins must achieve a destruction and removal efficiency of 99.9999 percent and PCBs must meet the technical standard in 40 CFR 761.70). Where generators choose to commingle one or both of these wastes with organic lab pack wastes listed in appendices IV and V, the entire lab pack must be incinerated to meet the more stringent standard. The following examples are provided for clarification:

(a) A lab pack containing dioxin-containing waste, California list PCBs and appendix V waste must be incinerated according to the technical standards of 40 CFR 761.70 and the applicable requirements of parts 264, 265, and 266 (including all applicable performance standards for dioxin-containing waste).

(b) A lab pack that contains only dioxin-containing waste (F020–23 and F026–28) *or* a mixture of dioxin-containing waste and organic hazardous waste codes listed in appendix V to part 268 must be incinerated according to the provisions in part 264 or 265 subpart O (including the applicable performance standards for dioxin-containing waste).

According to the provisions of today's final rule, generators may utilize the alternate treatment standards if their lab packs contain those wastes summarized below:

(a) "Appendix IV organometallic lab packs" may contain the following hazardous waste identified in appendix IV:

(1) Organometallic;
(2) Inorganic;
(3) Organic;
(4) D002 corrosives; and
(5) D003 reactives.

(b) "Appendix V organic lab packs" may contain only those organic hazardous wastes identified in appendix V.

Lab packs which contain any hazardous waste other than wastes listed in Appendix V are not appendix V organic lab packs, and may not use the alternate treatment standard.

d. Other Requirements

EPA proposed that generators or owners/operators who dispose of lab packs according to the alternate treatment standard must also meet the requirements for lab packs specified in 40 CFR 264.316 and 265.316. Several commenters expressed concern with the provision that requires metal outer containers (§ 264.316(b)) and § 265.316(b)), and pointed out that the original intent of these regulations was to ensure adequate containment for lab pack wastes that were being land disposed with or without prior treatment. The commenters further stated that lab packs destined for incineration are generally put in fiber packs that meet the Department of Transportation (DOT) requirements (49 CFR 173.12) and are suitable for incineration. The commenters requested that the Agency allow the continued use of fiber packs that meet applicable DOT requirements. The Agency does not wish to disrupt the use of fiber packs, and is amending §§ 264.316(b) and 265.316(b) to allow their continued use.

The Agency is promulgating its proposed approach with regard to generator notification requirements, and is requiring generators to list each EPA Hazardous Waste Code on a notification form and identify the applicable lab pack categories. Several commenters stated that the notification provision as proposed is burdensome. The Agency believes, however, that notification is necessary in order for owners/operators to verify that they are accepting for treatment only those waste codes covered under their permit. The Agency reiterates that the provisions promulgated in today's final rule do not supersede permit requirements under the RCRA hazardous waste program.

Generators or owners/operators who intend to utilize the applicable alternate treatment standard for hazardous waste codes listed in appendix IV and appendix V to part 268 must comply with the notification, certification, and recordkeeping requirements of 40 CFR 268.7(a) (7) and (8). They must also comply with the provisions in sections (a)(1), (a)(5), (a)(6), (b)(2) and (c). The Agency is requiring generators utilizing the alternate treatment standards to state whether the lab pack is an appendix IV or appendix V lab pack, and certify that hazardous wastes included therein are listed in the applicable appendix. The Agency emphasizes that lab packs containing hazardous wastes other than those listed in appendix IV and appendix V to part 268 are excluded from the alternate treatment standards for lab packs.

III.B Capacity Determinations

1. Determination of Alternative Capacity and Effective Dates for Surface-Disposed Wastes. Between May 8, 1990, when this rule was signed, and the date of its publication in the **Federal Register**, EPA discovered and corrected several discrepancies between the capacity variances discussed in the preamble and those included in the regulatory language. For details on those corrections, please contact those listed in the additional information section at the beginning of the preamble.

a. Total Quantity of Land-Disposed Wastes. The capacity analyses for wastes for which EPA is today finalizing treatment standards were conducted using the National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities (the TSDR Survey). EPA conducted the TSDR Survey during 1987 and early 1988 to obtain comprehensive data on the nation's capacity for managing hazardous waste and on the volumes of hazardous waste being disposed of in or on the land in 1986 (i.e., land disposal).

Survey data are part of the record for this final rule.

Other major sources of data include the National Survey of Hazardous Waste Generators, conducted by EPA during 1988 and 1989. This survey includes data on waste generation, waste characterization, and hazardous waste treatment capacity in units exempt from RCRA permitting. These data are also part of the record for this final rule.

For mixed RCRA/radioactive wastes, EPA used data supplied by the U.S. Department of Energy. Low-level radioactive waste survey data from individual states and State compacts were also used, as were data summaries in several overview reports on mixed radioactive waste.

The various land disposal methods used in 1986 and the quantities of waste they handled (excluding mixed radioactive wastes) are presented in Table III.B.1.(a). The data indicate about 5.7 billion gallons of the wastes for which standards are being finalized today were disposed of in or on the land. This estimate includes 77 million gallons that were stored in waste piles for short-term storage purposes. These stored wastes will eventually be treated, recycled, or permanently disposed of in other units. To avoid double counting, the volumes of wastes reported as being stored in waste piles have not been included in the volumes of wastes requiring alternative treatment.

EPA estimates that about 22 million gallons of treatment residuals from minimum technology impoundments or from impoundments that were replaced by a tank (e.g., standard cement, steel tanks) will require alternative treatment. EPA assumes that these wastes are now being sent off-site for treatment. Consequently, this amount is included as treatment capacity required in today's rule.

TABLE III.B.1.(a)—VOLUME OF WASTES BY LAND DISPOSAL METHOD FOR WHICH STANDARDS ARE BEING FINALIZED

[millions of gallons/year]

Land disposal method	Volume
Storage:	
Waste piles	77
Surface impoundments	2
Treatment:	
Waste piles	30
Surface impoundments	22
Disposal:	
Landfills	349
Land treatment	81
Surface impoundments	52
Underground injected	5,086

TABLE III.B.1.(a)—VOLUME OF WASTES BY LAND DISPOSAL METHOD FOR WHICH STANDARDS ARE BEING FINALIZED—Continued

[millions of gallons/year]

Land disposal method	Volume
Total	5,701

In addition, 30 million gallons of wastes were treated in waste piles, 52 million gallons were disposed of in surface impoundments, 430 million gallons were disposed of in land treatment units or landfills, and 5.1 billion gallons were injected underground. All of these wastes will require alternative treatment capacity.

EPA notes, however, that the TSDR Survey may overstate demand for treatment capcity for wastewaters that were treated or disposed of in surface impoundments at the time of the survey (1987 and early 1988). This overstatement is due to the requirement that impoundments receiving most hazardous wastes must now be retrofitted to meet minimum technology requirements, or taken out of service, as a result of RCRA section 3005(j). If an impoundment continues to operate after being retrofitted, it becomes a section 3005(j)(11) impoundment, provided that the wastewaters are treated and residues are removed annually. Wastewaters that are not treated or disposed of in surface disposal units, or that are treated in section 3005(j)(11) impoundments, do not create any demand for alternative commercial treatment capacity.

EPA solicited comments on those wastewaters currently disposed of in surface units that require alternative commercial treatment capacity. One commenter mentioned that EPA did not include volumes associated with surface impoundments awaiting closure. No commenter provided information on the volumes associated with these impoundments. Based on EPA's data, approximately ten percent of the surface impoundments that have submitted closure plans are awaiting closure plan approvals. EPA believes that most of these impoundments removed liquid hazardous wastes on or about November 8, 1988. EPA believes that the remaining volume of wastewaters in surface disposal units awaiting closure is small. Consequently, EPA did not include in the capacity analysis additional volumes associated with surface impoundments awaiting closure. (This discussion does not apply to wastewaters destined for deepwell disposal.)

EPA also requested comments on the quantity of RCRA P and U waste codes currently being disposed of in deepwells. The TSDR Survey data include some large-volume waste streams containing P and U RCRA codes. However, P and U wastes by definition are discarded off-specification products or residues and are usually generated in small volumes. Facilities disposing of these large-volume waste streams in deepwells have indicated that small volumes of P and U wastes were mixed with large volumes of other wastes, but the facilities were not able to provide a specific volume for the deepwell-disposed P and U wastes. Since the facilities generally described the volume of P and U wastes deepwell-disposed as "very small," EPA has assumed for the analysis of alternative treatment capacity that the national volume of P and U wastes needing alternative capacity is less than 100,000 gallons. EPA also requested comments on the assumption that the volumes of P and U wastes being deepwell-disposed are less than 100,000 gallons.

EPA received several comments concerning deepwell-injected P and U wastes. One commenter submitted data indicating that their facility disposed of 20,456 gallons of U wastes by deepwell injection in 1989. However, this commenter has received a no-migration petition approval and no alternative capacity is needed. One commenter indicated that EPA's methodology for determining actual P and U volumes was flawed, resulting in artificially low estimates, and believed that the true volume of these wastes was large enough to warrant a national capacity variance (3.3 million gallons at the commenter's facility alone). EPA has reviewed these data and agrees that the P and U volume at the second commenter's facility is much larger than previously assigned under the P and U methodology of 100,000 gallons. However, this volume has been determined to belong to a stream that is not a hazardous waste under Section 261.3(a)(2)(iv). The large volume of the stream does not reflect the volume of P and U wastes in the stream—which resulted from *de minimis* losses—but rather the total wastewater volume. This volume, therefore, does not require alternative treatment capacity. Consequently, EPA is not changing its P and U waste methodology and is not granting a national capacity variance to these wastes.

The following sections provide a summary of the capacity analysis for the

final rule. The detailed analyses are presented in the background document, and all data are included in the public docket.

b. Required Alternative Capacity for Surface-Disposed Wastes. EPA assessed the requirements resulting from today's final rule for alternative treatment capacity for surface-disposed wastes. Using primarily the TSDR and Generator Survey data, EPA first characterized the volumes of wastes for which treatment standards are being established. Waste streams were characterized on the basis of land disposal method, waste code, physical and chemical form, and waste characterization data. Using this information, EPA placed the wastes in eatability groups associated with plicable treatment technologies. The aste volumes were then summed by eatability group to determine the nount and type of alternative eatment capacity that would be quired when owners or operators mply with the land disposal strictions being finalized today. Based on this analysis, EPA estimates at today's rule could affect about 5.7 llion gallons of wastes that are land-sposed annually. This total includes 77 llion gallons in short-term storage, d 79 million gallons that already meet eatment standards or that can be eated on-site. Consequently, only out 5.5 billion gallons will require eatment to meet standards EPA is omulgating in today's rule. Of this al, 515 million gallons were surface-sposed (i.e., excluding underground ection), and the remaining 5 billion llons were underground injected. (See ction 2 for determinations of ernative capacity and effective dates wastes injected underground.) EPA timates that treatment of these rface-disposed and deepwell-injected astes will generate approximately 82 llion gallons of residuals requiring eatment before land disposal. The volumes of surface-disposed astes by waste codes that require mmercial treatment and/or recycling pacity to meet the standards that EPA promulgating today are presented in ble III.B.1.(b). This table does not clude waste volumes that can be eated on-site by the generator, nor es it contain volumes of mixed dioactive wastes.

As explained in section III.A of this eamble, EPA is finalizing treatment ndards expressed either as ncentration limits based on the rformance of the BDAT, or as a ecific treatment technology. When a eatment standard is expressed as a ncentration limit, a specific treatment ethod is not required to achieve that concentration level. However, the BDAT (and comparable technologies), as discussed in Section III.A., were used as the basis for determining available capacity. When the treatment standard is expressed as a specific technology (rather than a concentration limit), that technology must be used.

The TSDR Survey contains data on specific treatment processes at facilities. The data enable EPA to identify specific BDAT treatment (and comparable treatment) in its assessment of both off-site and on-site capacity. Therefore, EPA believes that the capacity identified as available for a specific treatment technology will be capable of meeting the BDAT standard, which has been developed such that a well-designed and well-operated BDAT treatment process should be capable of meeting it.

In the proposed rule, EPA established criteria for differentiating between a liquid and a solid waste because of the variance for D001 sludges and solids. EPA requested comments on the proposed criteria, and during the public comment period received two comments requesting clarification of the sludge/solid definition. EPA also received several comments identifying additional sludge/solid incineration capacity. Commenters identified new units at existing facilities and increased capacity resulting from trial burns conducted after the 1986 survey. Based on an analysis of this information, EPA has determined that there is adequate capacity to incinerate D001 sludge/solid wastes. Consequently, EPA is not granting D001 sludge/solids a variance, and the criteria proposed for differentiating between a liquid and a solid are no longer necessary.

TABLE III.B.1.(b)—REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR SURFACE-DISPOSED WASTES

[million gallons/year]

Waste code	Capacity required for surface-disposed wastes
First Third Code:	
F006	20.3
F019	12.6
K004	0.1
K017	<0.1
K021	<0.1
K031	0.6
K035	<0.1
K048	37.1
K049	31.7
K050	11.8
K051	78.1
K052	12.5
K073	<0.1

TABLE III.B.1.(b)—REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR SURFACE-DISPOSED WASTES—Continued

[million gallons/year]

Waste code	Capacity required for surface-disposed wastes
K084	0.2
K085	<0.1
K106	0.5
P001	<0.1
P004	<0.1
P005	<0.1
P010	<0.1
P011	<0.1
P012	<0.1
P015	<0.1
P018	<0.1
P020	<0.1
P037	<0.1
P048	<0.1
P050	<0.1
P058	<0.1
P059	<0.1
P069	<0.1
P070	<0.1
P081	<0.1
P087	<0.1
P092	<0.1
P105	<0.1
P108	<0.1
P115	<0.1
P120	<0.1
P123	<0.1
U007	<0.1
U009	<0.1
U010	<0.1
U012	<0.1
U019	<0.1
U022	<0.1
U029	<0.1
U031	<0.1
U036	<0.1
U037	<0.1
U043	<0.1
U044	<0.1
U050	<0.1
U051	0.1
U061	<0.1
U066	<0.1
U067	<0.1
U077	<0.1
U078	<0.1
U103	<0.1
U105	<0.1
U108	<0.1
U122	<0.1
U129	<0.1
U133	<0.1
U134	<0.1
U151	<0.1
U154	<0.1
U158	0.3
U159	<0.1
U177	<0.1
U180	<0.1
U185	<0.1
U188	0.3
U192	<0.1
U209	<0.1
U210	<0.1
U211	<0.1
U219	<0.1
U220	0.1
U226	<0.1
U227	2.7
U228	<0.1

TABLE III.B.1.(b)—REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR SURFACE-DISPOSED WASTES—Continued

[million gallons/year]

Waste code	Capacity required for surface-disposed wastes
U237	<0.1
U238	<0.1
U248	<0.1
U249	<0.1
Second Third Code:	
F024	<0.1
K105	<0.1
P002	<0.1
P003	<0.1
P014	<0.1
P066	<0.1
P067	<0.1
U002	<0.1
U003	<0.1
U005	<0.1
U008	<0.1
U014	<0.1
U021	<0.1
U032	<0.1
U047	<0.1
U057	<0.1
U070	<0.1
U073	<0.1
U080	2.7
U083	<0.1
U092	<0.1
U093	<0.1
U101	<0.1
U106	<0.1
U109	<0.1
U114	<0.1
U116	<0.1
U119	<0.1
U127	<0.1
U131	0.1
U140	<0.1
U142	<0.1
U144	<0.1
U146	<0.1
U147	<0.1
U149	<0.1
U161	<0.1
U162	<0.1
U165	<0.1
U169	<0.1
U170	<0.1
U196	<0.1
U208	<0.1
U213	<0.1
U214	<0.1
U217	<0.1
U218	<0.1
U239	0.2
U244	<0.1
Third Third Code:	
D001	19.6
D002	25.6
D003	9.2
D004	12.8
D005	16.4
D006	16.3
D007	118.4
D008	73.0
D009	4.0
D010	2.0
D011	2.5
D012	0.5
D013	0.4
D014	1.9
D015	<0.1
D016	0 2

TABLE III.B.1.(b)—REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR SURFACE-DISPOSED WASTES—Continued

[million gallons/year]

Waste code	Capacity required for surface-disposed wastes
D017	0.4
F039 [1]	46.6
K002	0.2
K003	0.2
K005	0.1
K006	0.2
K069	<0.1
K083	<0.1
P006	<0.1
P022	<0.1
P024	<0.1
P028	<0.1
P031	<0.1
P047	<0.1
P051	<0.1
P064	<0.1
P073	<0.1
P075	<0.1
P077	<0.1
P088	<0.1
P093	<0.1
P119	<0.1
U001	<0.1
U004	<0.1
U006	<0.1
U017	<0.1
U030	<0.1
U039	<0.1
U048	<0.1
U052	<0.1
U055	0.2
U056	<0.1
U071	<0.1
U072	0.2
U075	<0.1
U076	<0.1
U079	<0.1
U081	<0.1
U082	<0.1
U112	<0.1
U117	<0.1
U118	<0.1
U120	<0.1
U121	<0.1
U123	<0.1
U125	<0.1
U126	<0.1
U148	<0.1
U156	<0.1
U167	<0.1
U181	<0.1
U182	<0.1
U201	<0.1
U202	<0.1
U204	<0.1
U225	<0.1
U234	<0.1
U240	<0.1
U247	<0.1

[1] Multi-source leachate.

c. Capacity Currently Available and Effective Dates. Table III.B.1.(c) presents an estimate for each treatment technology of the volumes of wastes that will require alternative treatment before land disposal to comply with the standards finalized today. The amount of capacity that is available at commercial facilities in each case is also presented. Available capacity was calculated using the TSDR Survey and other capacity data. Available capacity is equal to the specific treatment system's maximum capacity minus the amount used in 1986. In addition, the available capacity presented in this section was adjusted to account for wastes previously restricted from land disposal by subtracting the capacity required for land-disposed solvent wastes, First Third wastes, and Second Third wastes.

In general, Table III.B.1.(c) indicates that there is inadequate capacity for certain technologies: combustion of sludges and solids, mercury retorting, acid leaching followed by chemical precipitation, thermal recovery, and vitrification.

For combustion of sludges and solids, there is inadequate capacity for sludges and solids derived from treating multi-source leachate, for K048 through K052 nonwastewaters (temporarily), and soil and debris. (See section III.B.3 for a more detailed discussion.) However, there is adequate capacity for all other wastes needing combustion of sludges and solids. For mercury retorting, there is inadequate capacity for high mercury D009, K106, and U151 nonwastewaters. However there is adequate capacity for other wastes needing this technology. For acid leaching and chemical precipitation, there is insufficient capacity to treat low-mercury D009, K106, P065, P092, and U151 nonwastewaters. For thermal recovery, EPA has determined that there is insufficient capacity for P087 wastewaters and nonwastewaters. For vitrification, there is inadequate capacity for arsenic nonwastewaters.

It is important to note that some of the wastes, because of their actual physical form, cannot be treated to meet standards simply by using the technology identified as BDAT. These wastes must be treated through several steps, called a "treatment train." EPA assumes that the resultant residuals will also need to be treated using alternative technologies before land disposal; therefore, the total volumes reported were assigned to appropriate technologies.

The following sections discuss the results of the individual capacity analyses and effective dates for each waste code included in today's final rule. Table III.B.1.(d) summarizes all the surface-disposed wastes for which EPA is granting a two-year variance. The detailed basis for EPA's conclusions can be found in the capacity background document for this final rule.

TABLE III.B.1.(c)—AVAILABLE AND REQUIRED ALTERNATIVE COMMERCIAL TREATMENT (INCLUDING RECYCLING) CAPACITY FOR SURFACE-DISPOSED WASTES

[millions of gallons/yr. [1]

Technology	Available capacity	Required capacity	Variance
Acid leaching followed by chemical precipitation [2]	0	3	Yes
Alkaline chlorination	7	6	No
Alkaline chlorination followed by chemical precipitation	6	2	No
Biological treatment	47	<1	No
Biological treatment followed by chemical precipitation	14	<1	No
Chemical oxidation followed by chemical precipitation	28	7	No
Chemical oxidation followed by chromium reduction and chemical precipitation	2	2	No
Chemical precipitation	339	25	No
Chromium reduction followed by chemical precipitation	96	85	No
Combustion of liquids	237	16	No
Combustion of sludges/solids	41	[4] 213	Yes
Mercury retorting	<1	3	Yes
Neutralization	36	22	No
Secondary lead smelting	37	2	No
Stabilization	478	158	No
Thermal recovery [3]	0	<1	Yes
Thermal recovery of cadmium batteries	<1	<1	No
Vitrification	0	22	Yes

[1] This table does not include mixed radioactive wastes, which are receiving a national capacity variance for all applicable treatment technologies.
[2] EPA has insufficient data to differentiate between low and high mercury nonwastewaters. Consequently, EPA conducted a worst-case analysis and assigned all nonwastewater volumes to both the high concentration and low concentration technologies (i.e., mercury retorting and acid leaching followed by chemical precipitation, respectively). EPA had no data on commercial acid leaching and chemical precipitation capacity and believes there is insufficient capacity to treat these low mercury nonwastewaters.
[3] Excluding secondary smelting of lead wastes.
[4] For further clarification of this number, see the discussion on K048–K052.

TABLE III.B.1.(d)—SUMMARY OF NATIONAL CAPACITY VARIANCES FOR SURFACE-DISPOSED WASTES [1]

Required alternative treatment technology	Waste code/Physical form
Acid leaching and chemical precipitation.	D009 Low mercury nonwastewater.
	K106 Low mercury nonwastewater.
	P065 Low mercury nonwastewater.
	P092 Low mercury nonwastewater.
	U151 Low mercury nonwastewater.
Combustion of sludge/solids.	F039 [2] Nonwastewater.
	K048 [3] Nonwastewater.
	K049 [3] Nonwastewater.
	K050 [3] Nonwastewater.
	K051 [3] Nonwastewater.
	K052 [3] Nonwastewater.
Mercury retorting	D009 High mercury nonwastewater.
	K106 High mercury nonwastewater.
	P065 High mercury nonwastewater.
	P092 High mercury nonwastewater.
	U151 High mercury nonwastewater.
Secondary smelting storage area.	D008 Lead materials before secondary smelting.
Thermal recovery	P087 Nonwastewater/wastewater.
Vitrification	D004 Nonwastewater.
	K031 Nonwastewater.
	K084 Nonwastewater.
	K101 Nonwastewater.
	K102 Nonwastewater.
	P010 Nonwastewater.
	P011 Nonwastewater.
	P012 Nonwastewater.
	P036 Nonwastewater.
	P038 Nonwastewater.
	U136 Nonwastewater.

[1] EPA is granting these wastes a two-year national capacity variance, except for K048–K052 nonwastewaters. This table does not include mixed radioactive wastes, which are receiving a national capacity variance for all applicable treatment technologies.
[2] Multi-source leachate.
[3] For K048–K052 petroleum-refining nonwastewaters, EPA is granting only a 6 month variance.

(1) *Ignitable, Corrosive, Reactive, and EP Toxic Halogenated Pesticide Characteristic Wastes.* This group includes ignitable characteristic wastes (D001), corrosive characteristic wastes (D002), reactive characteristic wastes (D003), and EP toxic halogenated pesticides (D012, D013, D014, D015, D016, and D017).

(a) Ignitable Characteristic Wastes (D001). EPA has identified four subcategories for D001 wastes: ignitable liquids, ignitable reactives, oxidizers, and ignitable compressed gases. EPA has determined that the D001 ignitable liquids subcategory should be divided into three treatability groups: (1) D001 ignitable liquid nonwastewaters with a TOC content greater or equal to ten percent, (2) D001 ignitable liquid nonwastewaters with a TOC content greater than one percent but less than ten percent, and (3) D001 ignitable liquid wastewaters. EPA is promulgating deactivation as the method of treatment for ignitable liquids nonwastewaters with a TOC content less than ten percent. For ignitable liquids nonwastewaters with a TOC content greater than or equal to 10 percent, EPA is promulgating incineration, fuel substitution, or recovery as methods of treatment. EPA is promulgating deactivation as the method of treatment for D001 ignitable liquids wastewaters. For capacity analysis purposes, EPA assigned volumes of these wastes to incineration. Sufficient treatment capacity exists for the D001 ignitable liquids wastes destined for surface disposal; therefore, no capacity variance is being granted for them.

EPA requested comments on availability of capacity for incineration of D001 liquids mixed with sludges and solids. Several commenters stated that adequate capacity exists to treat D001 liquids mixed with sludges and solids, and therefore, that no capacity variance should be granted to these wastes. Based on the review of available sludges and solids treatment capacity

data for incineration and cement kilns, EPA has determined that adequate capacity exists to treat surface-disposed D001 liquids wastes. Therefore, EPA is not granting a national capacity variance for these wastes.

EPA is promulgating deactivation as the method of treatment for D001 ignitable reactives and oxidizers. EPA has determined that sufficient capacity exists for these wastes; therefore, EPA is not granting a national capacity variance for them.

For D001 ignitable compressed gases, EPA is promulgating deactivation as the method of treatment. EPA has determined that adequate capacity exists for these wastes; therefore, EPA is not granting a national capacity variance for them.

(b) Corrosive Characteristic Wastes (D002). EPA has identified three treatability groups for D002 wastes: acids, alkalines, and other corrosives. EPA is promulgating deactivation, which includes neutralization, as the method of treatment for the D002 acid and alkaline subcategories. In addition, recovery of acids or bases is included as an option for these standards. By definition, wastes in these subcategories are liquids; therefore based on the limited number of surface impoundments that meet minimum technology requirements and the ban on liquids in landfills, EPA believes that few, if any, of these wastes are surface-disposed. For the capacity analysis, EPA assigned all D002 wastes to neutralization. EPA has determined that sufficient neutralization capacity does exist for acid and alkaline D002 wastes that are surface-disposed; therefore, EPA is not granting a national capacity variance for them.

For the D002 other corrosives category, EPA is promulgating deactivation as the method of treatment. These wastes can be deactivated using chemical reagents or by other means. In addition, EPA believes that these wastes are generated in low volumes. Therefore, EPA is not granting a national capacity variance for them.

(c) Reactive Characteristic Wastes (D003). For D003 wastes, EPA has identified five treatability groups: reactive cyanides, explosives, water reactives, reactive sulfides, and other reactives. For D003 cyanides, EPA is promulgating concentration standards based on alkaline chlorination, wet-air oxidation, or electrolytic oxidation. Although reactive cyanides account for the majority of D003 generated wastes, EPA believes that most are already restricted from landfills by existing regulations (40 CFR Part 264.312, 265.312). EPA believes that sufficient capacity does exist for the volume of surface-disposed D003 cyanide reactive wastes; therefore, EPA is not granting a national capacity variance for them.

For D003 reactive sulfides, EPA is promulgating deactivation as the method of treatment, which includes chemical oxidation. EPA believes sufficient capacity does exist for the volume of surface-disposed D003 sulfide wastes; therefore, EPA is not granting a national capacity variance for them.

For D003 explosive wastes, EPA is promulgating deactivation as the method of treatment. Because most of these wastes are already restricted from land disposal by existing regulations and are commonly burned and/or detonated, EPA is not granting a national capacity variance for them.

For D003 water-reactive wastes, EPA is promulgating deactivation as the method of treatment. EPA believes that these wastes are generated sporadically and in low volumes and are not typically land-disposed. Therefore, EPA is not granting a national capacity variance for them.

For other reactive D003 wastes, EPA promulgating deactivation as the method of treatment. EPA believes these wastes could be incinerated or detonated openly and that there is adequate capacity for treating the small volumes that are surface-disposed. Therefore, EPA is not granting a national capacity variance for them.

(d) EP Toxic Halogenated Pesticide Wastes.

D012—Characteristic of EP Toxic for Endrin
D013—Characteristic of EP Toxic for Lindane
D014—Characteristic of EP Toxic for Methoxychlor
D015—Characteristic of EP Toxic for Toxaphene
D016—Characteristic of EP Toxic for 2,4–D
D017—Characteristic of EP Toxic for 2,4,5-TP

For these EP toxic halogenated pesticide nonwastewaters, EPA is promulgating concentration standards based on incineration. For D012 and D015 wastewaters, EPA is promulgating incineration or biological treatment as methods of treatment; for D013 wastewaters, EPA has set incineration or carbon adsorption as methods of treatment; for D014 wastewaters, EPA is promulgating incineration or wet-air oxidation as methods of treatment; for D016 and D017 wastewaters, EPA has set incineration or chemical oxidation as methods of treatment. EPA has also set biodegradation as an alternate method of treatment for D016 nonwastewaters. EPA has determined that sufficient treatment capacity exists for these wastes; therefore, EPA is not granting EP toxic pesticide wastewaters and nonwastewaters a national capacity variance.

(2) *Metal Wastes.* This group includes arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, thallium, and vanadium wastes.

(a) Arsenic Wastes

D004—EP Toxic for arsenic
K031—By-product salts genrated in the production of MSMA and cacodylic acid
K084—Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds
K101—Distillation tar residues from the distillation of aniline-based compounds in the production of verterinary pharmaceuticals from arsenic or organo-arsenic compounds
K102—Residues from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds
P010—Arsenic acid
P011—Arsenic (V) oxide
P012—Arsenic (III) oxide
P036—Dichlorophenylarsine
P038—Diethylarsine
U136—Cacodylic acid

For arsenic nonwastewaters, EPA is promulgating concentration standards based on vitrification. EPA has determined that for some arsenic nonwastewaters the standards can be met with chemical or thermal oxidation to the arsenate form followed by chemical precipitation with iron salts followed by arsenic stabilization of the precipitate. This technology may be inappropriate for all arsenic nonwastewaters because organics are known to interfere with the stabilization process. EPA believes vitrification will work for all forms of arsenic nonwastewaters, because high temperatures are expected to destroy the organo-metallic bonds, and therefore, its performance is not limited by the presence of organics. Thus, EPA has assigned arsenic nonwastewaters to vitrification for the capacity analysis. The TSDR Survey indicates that no commercial vitrification capacity exists. EPA requested information on commercial vitrification capacity, but received no comments demonstrating that this type of capacity exists. Therfore, EPA is granting a two-year capacity variance to the surface-disposed arsenic nonwastewaters listed above.

For arsenic wastewaters, EPA is promulgating concentration standards based on chemical precipitation. The TSDR Survey and other capacity data indicate that adequate chemical precipitation capacity exists: therefore,

EPA is not granting arsenic wastewaters a capacity variance.

(b) Barium Wastes. For D005 and P013 wastewaters, EPA is promulgating concentration standards based on chemical precipitation; for D005 and P013 (except as indicated below) nonwastewaters, EPA is promulgating concentration standards based on stabilization.

For P013 nonwastewaters with high levels of organics, EPA is requiring that these wastes be incinerated prior to stabilization. Sufficient capacity exists to treat surface-disposed D005 and P013 wastes. Therefore, EPA is not granting a national capacity variance for them.

(c) Cadmium Wastes. For D006 wastes, EPA is promulgating treatment standards for three categories: wastewaters, nonwastewaters, and cadmium batteries.

For D006 wastewaters, EPA is promulgating concentration standards based on chemical precipitation. For D006 nonwastewaters, EPA is promulgating concentration standards based on stabilization or metal recovery. EPA believes that sufficient capacity exists to treat surface-disposed cadmium nonwastewaters and wastewaters. Therefore, EPA is not granting a national capacity variance for them.

For D006 cadmium batteries, EPA is promulgating thermal recovery as the method of treatment. In the proposed rule, EPA proposed granting D006 cadmium batteries a national capacity variance due to a lack of identified recovery capacity. During the public comment period, two commenters identified available commercial cadmium battery recovery capacity (these comments were available for reply comments). EPA contacted these commenters to verify their capacity. Based on these contacts, EPA received additional information and determined that adequate capacity for treating surface-disposed cadmium batteries exists. Therefore, EPA is not granting D006 cadmium batteries a national capacity variance.

(d) Chromium Wastes. For D007 chromium and U032 (calcium chromate) wastewaters, EPA is promulgating concentration standards based on chromium reduction followed by chemical precipitation; for D007 and U032 nonwastewaters, EPA is promulgating concentration standards based on chromium reduction followed by stabilization. EPA believes sufficient treatment capacity exists for the volume of these wastes. Therefore, EPA is not granting a national capacity variance for them.

(e) Lead Wastes.

D008—EP toxic for lead
P110—Tetraethyl lead
U144—Lead acetate
U145—Lead phosphate
U146—Lead subacetate
K069—Emission control dust/sludge from secondary lead smelting
K100—Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting

For D008 wastes, EPA is promulgating standards for three categories: nonwastewaters, wastewaters, and lead-acid batteries. For D008 nonwastewater lead wastes, EPA is promulgating concentration standards based on stabilization, except where the waste contains significant concentrations of organics. In this case, these wastes may need to be incinerated prior to stabilization. For D008 wastewaters, EPA is promulgating concentration standards based on chemical precipitation. EPA believes sufficient capacity exists for surface-disposed D008 wastewaters and nonwastewaters. Therefore, EPA is not granting a national capacity variance for D008 wastewaters and nonwastewaters, with the exceptions noted below.

EPA is promulgating thermal recovery as the method of treatment for lead-acid batteries. Secondary lead smelters have stated that they store these wastes in piles prior to recovery. EPA has indicated in a previous rulemaking that the shells surrounding lead-acid batteries are considered to be storage containers (see 47 FR 12318 and 40 CFR 264.314(f)(3)). Therefore, to the extent that lead-acid battery storage meets all the requirements of the LDR storage prohibitions at 40 CFR 268.50, such storage is permissible.

In the proposed rule, EPA solicited comments on the management of other D008 lead material at secondary smelters. EPA also indicated that storage of lead materials in waste piles prior to smelting is a form of land disposal, and as such these staging areas are subject to the statutory prohibitions. During the public comment period, EPA received several comments from the secondary lead smelting industry regarding the storage of battery parts prior to smelting. Several commenters expressed concern that EPA's determination that staging piles are a form of land-disposal could force them to close or operate out of compliance while staging piles are replaced by tanks (assuming tank storage is viable). As a result of these comments, EPA contacted several secondary smelters to asses the potential capacity impact of required staging area reconstruction. Because of the large volume of batteries currently processed at smelting facilities whose continued storage operation remains in question, EPA is granting a two-year national capacity variance to allow storage of the batteries preceding smelting. EPA is also reconsidering whether certain forms of battery parts storage meet the meaning of "land disposal" under section 3004(k). In particular, if battery parts (or other wastes) are stored in 3-sided tank-like devices on concrete inside buildings (the present storage method of some secondary lead smelters) the Agency is not certain that the language and policies underlying section 3004(k) warrant designating such practice as "land disposal." Given the two-year national capacity variance in this rule, however, the Agency need not make a final decision on this point in this rulemaking.

For P110, U144, U145, and U146 wastes, EPA is promulgating concentration standards based on chemical oxidation followed by chemical precipitation for wastewaters, and stabilization for nonwastewaters. P110, U144, U145, and U146 nonwastewaters containing significant concentrations of organics may require incineration prior to stabilization. EPA believes sufficient capacity exists for the small volume of these wastes that are surface-disposed; therefore, EPA is not granting a national capacity variance for them.

EPA is revoking the no land disposal standard based on recycling standard promulgated in the First Third rule for the non-calcium sulfate subcategory for K069 nonwastewaters. For K069 calcium sulfate nonwastewaters, EPA is promulgating concentration standards based on stabilization. For K069 non-calcium sulfate nonwastewaters, EPA is promulgating recycling as the method of treatment. For K069 wastewaters, EPA is promulgating concentration standards based on chemical precipitation. EPA believes adequate capacity exists to treat the volume of surface-disposed K069 wastewaters and nonwastewaters; therefore, EPA is not granting a capacity variance for them.

For K100 nonwastewaters, EPA is revoking the no land disposal standard based on the "no generation standards" promulgated in the First Third rule. Today, EPA is promulgating concentration standards based on stabilization for the nonwastewaters and chemical precipitation for the wastewaters. EPA believes adequate capacity exists to treat the volume of surface-disposed K100 wastes. Therefore, EPA is not granting a capacity variance for them.

(f) Mercury Wastes.

D009—EP toxic for mercury
K071—Brine purification muds from the mercury cell process in chlorine production, where separately repurified brine is not used
K106—Wastewater treatment sludges from the mercury cell process in chlorine production
P065—Mercury fulminate
P092—Phenylmercuric acetate
U151—Mercury

For D009, K106, and U151 wastewaters, EPA is promulgating concentration standards based on chemical precipitation. For P065 and P092 wastewaters, EPA is promulgating concentration standards based on chemical oxidation followed by chemical precipitation. K071 wastewater standards were promulgated in the First Third rule and remain unchanged. It should be noted that mercury-bearing wastewaters containing hexavalent chromium may require chromium reduction prior to treatment of the mercury. Likewise, wastewaters containing organics may require chemical oxidation prior to treatment of the mercury.

For mercury nonwastewaters, EPA is establishing low mercury and high mercury subcategories. For the high mercury subcategory (greater than or equal to 260 mg/kg), EPA is promulgating roasting or retorting as methods of treatment for D009, K106, and U151 nonwastewaters. For the high mercury subcategory of P065 and P092 nonwastewaters, EPA is promulgating incineration followed by roasting or retorting as the method of treatment. For the low mercury subcategory of D009, K106, P065, P092, and U151 nonwastewaters, EPA is promulgating concentration standards based on acid leaching and chemical precipitation.

Treatment standards for K071 nonwastewaters were originally promulgated in the First Third rule. In the proposed Third Third rule, EPA proposed to revise the standards for K071 nonwastewaters with a high mercury content. For this high mercury subcategory, EPA proposed roasting or retorting as methods of treatment. For the final rule, EPA is not adopting the proposed revisions to K071 wastes, and the promulgated First Third BDAT remains unchanged.

EPA believes sufficient capacity exists to treat the volume of all surface-disposed mercury wastewaters. Therefore, EPA is not granting a national capacity variance for them. Because current data do not provide sufficient information on the volume of nonwastewaters that contain high and low concentrations of mercury, EPA conducted a worst-case analysis and assigned all volumes of surface disposed mercury nonwastewaters to both mercury retorting and acid leaching followed by chemical precipitation. EPA has identified a small amount of commercial mercury retorting capacity (16,000 gallons). There is insufficient mercury retorting capacity for D009, K106, and U151 nonwastewaters. Due to the sporadic generation rate of P wastes from year to year and the small amount of available commercial mercury retorting capacity, EPA is granting all high mercury nonwastewaters a two-year national capacity variance. EPA has also determined that there is insufficient commercial capacity for acid leaching followed by chemical precipitation; therefore, EPA is granting low mercury D009, K106, P065, P092, and U151 nonwastewaters a national capacity variance.

(g) Selenium wastes.

D010—EP Toxic for selenium
P103—Selenourea
P114—Thallium selenite
U204—Selenious acid
U205—Selenium disulfide

For selenium nonwastewaters, EPA is promulgating concentration standards based on stabilization. EPA has also determined that vitrification or recovery may be used to reach the standards. The TSDR Survey and other capacity data indicate that adequate stabilization capacity exists. Therefore, EPA is not granting selenium nonwastewaters a national capacity variance.

For selenium wastewaters, EPA is promulgating concentration standards based on chemical precipitation. The TSDR Survey and other capacity data indicate that adequate chemical precipitation capacity exists; therefore, EPA is not granting selenium wastewaters a national capacity variance.

(h) Silver Wastes.

D011—EP toxic for silver
P099—Potassium silver cyanide
P104—Silver cyanide

Treatment standards for P099 and P104 nonwastewaters were promulgated in the Second Third final rule. For P099 and P104 wastewaters, EPA is promulgating concentration standards based on chemical precipitation. For D011, EPA is promulgating concentration standards based on chemical precipitation for wastewaters, and recovery or stabilization for nonwastewaters. EPA believes adequate capacity exists to treat surface-disposed D011, P099, and P104 wastewaters and D011 nonwastewaters. Therefore, EPA is not granting a capacity variance for them.

(i) Thallium Wastes.

P113—Thallic oxide
P114—Thallium selenite
P115—Thallium (I) sulfate
U214—Thallium (I) acetate
U215—Thallium (I) carbonate
U216—Thallium (I) chloride
U217—Thallium (I) nitrate

For P113, P115, U214, U215, U216, and U217, EPA is promulgating thermal recovery or stabilization as methods of treatment for nonwastewaters, and concentration standards based on chemical precipitation for wastewaters. For P114, EPA is promulgating concentration standards based on stabilization, vitrification, recovery for nonwastewaters, and chemical precipitation for wastewaters. Based on the TSDR Survey and other capacity data, adequate capacity exists for surface-disposed thallium wastewaters and nonwastewaters. Therefore, EPA is not granting a national capacity variance for them.

(j) Vanadium Wastes.

P119—Ammonium vanadate
P120—Vanadium pentoxide

For P119 and P120, EPA is promulgating stabilization as the method of treatment for nonwastewaters, and concentration standards based on chemical precipitation for wastewaters. Because adequate capacity exists for chemical precipitation and stabilization, EPA is not granting P119 and P120 wastewaters and nonwastewaters a national capacity variance.

(3) *Treatment Standards for Remaining F and K Wastes and U051.* These groups include certain F002 and F005 wastes; F006 wastewaters and F019; F024; F025; K001 and U051; wastes from pigment production (K002 through K008); K011, K013, K014; K015; K017 and K073; K021; K022; K025, K026, K035, and K083; K028, K029, K095, and K096; K032, K033, K034, K041, K097, and K098 wastes; K036 and K037; K042, K085, and K105 wastes; K044, K045, K046, K047; K048 through K052; K060; K061 wastewaters; and K086.

(a) Additional Treatment Standards for F002 and F005 Wastes. Treatment standards for F002 and F005 were promulgated in the Solvents and Dioxins rule. Today, EPA is revising the treatment standards for F002 and F005 to account for four newly listed F002 and F005 constituents. Wastewater concentration standards for F002 containing 1,1,2-Trichloroethane and F005 containing benzene are based on: biological treatment, or steam stripping, or carbon adsorption, or liquid

extraction. For nonwastewaters, concentration standards for these two solvents are based on incineration. For F005 containing 2-Ethoxyethanol, EPA is promulgating incineration as the method of treatment for nonwastewaters, and incineration or biodegradation as methods of treatment for wastewaters. For F005 wastewaters containing 2-nitropropane, EPA is promulgating incinceration, or wet-air oxidation followed by carbon adsorption, or chemical oxidation followed by carbon adsorption as methods of treatment. For F005 nonwastewaters containing 2-nitropropane, EPA is requiring incineration as the method of treatment. EPA believes that adequate treatment capacity exists for these wastes; therefore, EPA is not granting a national capacity variance for them.

(b) F006 and F019 Wastes. For F006 wastewaters, EPA is promulgating concentration standards based on alkaline chlorination for cyanides and chromium reduction followed by chemical precipitation for metals. EPA believes that adequate capacity exists for the volume of surface-disposed F006 wastewaters. Therefore, EPA is not granting a national capacity variance for them.

EPA is promulgating concentration standards for F019 wastewaters based on alkaline chlorination for cyanides and chromium reduction followed by chemical precipitation for chromium. In the proposed rule, EPA proposed treatment standards for amenable and total cyanide in F019 nonwastewaters based on wet-air oxidation. Due to insufficient wet-air oxidation capacity, EPA proposed a national capacity variance for these wastes. In the final rule, EPA is promulgating F019 nonwastewater concentration standards based on alkaline chlorination for cyanides and stabilization for chromium. Because sufficient treatment capacity exists to treat the F019 wastewaters and nonwastewaters, EPA is not granting a national capacity variance for them.

(c) F024 Wastes. EPA promulgated concentration standards for F024 wastewaters and nonwastewaters in the Second Third rule based on rotary kiln incineration for the organic constituents in nonwastewaters, and rotary kiln incineration for organic constituents followed by chemical precipitation for metal constituents in wastewaters. Today, EPA is revising certain of these standards and is promulgating concentration standards based on stabilization for metal constituents in F024 nonwastewaters. EPA is providing the option of incineration as a treatment method for this waste in order to remove obstacles to acceptance, previously created by the explicit standard for dioxins and furans. Several commenters responded to EPA's request for information, indicating that the treatment facilities were not accepting the wastes due to the dioxin and furan standard. Today's revisions to the treatment standards are expected to ensure that sufficient capacity is available to treat F024, and that all F024 wastes containing dioxins and furans will be incinerated, thereby ensuring effective treatment of these constituents. EPA has determined that adequate capacity exists to treat these wastewaters and nonwastewaters; therefore, EPA is not granting a national capacity variance for them.

(d) F025 Wastes. On December 11, 1989 (54 FR 50968), EPA amended the listing for F025 waste (condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatics). The listing becomes effective on June 11, 1990. Most generators already treat F025 as if it were hazardous, and some facilities commingle F024 and F025. Today, EPA is promulgating concentration standards for all categories of F025 wastewaters and nonwastewaters based on incineration. EPA has determined that no alternative treatment capacity is needed for F025 wastes. Therefore, EPA is not granting these wastes a national capacity variance, restricting land disposal on August 8, 1990.

(e) K001 and U051 Wastes. EPA is promulgating revisions to the concentration-based treatment standards for K001 organics due to a mathematical error that was made in the calculation of the original standards in the First Third rule. Since the treatment standards for U051 wastewaters and nonwastewaters are based on a transfer of the performance of K001, the concentration-based standards for U051 also reflect this change. For the organics in K001 and U051 wastewaters and nonwastewaters, EPA is promulgating concentration standards based on incineration. EPA is also finalizing concentration standards for lead in K001 and U051 based on stabilization for nonwastewaters and chemical precipitation for wastewaters. Sufficient capacity exists for treatment of both of these wastes; therefore, EPA is not granting a national capacity variance for them.

(f) Wastes from Inorganic Pigment Production (K002, K003, K004, K005, K006, K007, and K008). EPA is amending the no land disposal standard previously promulgated for K004, K005, K007, and K008 nonwastewaters. EPA is promulgating concentration standards based on chromium reduction followed by chemical precipitation for K002, K003, K004, K006, and K008 wastewaters, and alkaline chlorination followed by chromium reduction followed by chemical precipitation for K005 and K007 wastewaters. For nonwastewater forms of these wastes, EPA is promulgating concentration standards based on stabilization. EPA believes that sufficient capacity exists for surface-disposed K002, K003, K004, K005, K006, K007, and K008 wastewaters and nonwastewaters. Therefore, EPA is not granting a capacity variance for them.

(g) K011, K013, and K014 Wastes. Treatment standards for the surface disposal of nonwastewater forms of K011, K013, and K014 were promulgated in the Second Third final rule. For K011, K013, and K014 wastewaters, EPA is promulgating concentration standards based on wet-air oxidation. The TSDR Survey indicates that sufficient capacity exists for the volume of surface-disposed K011, K013, and K014 wastewaters. Therefore, EPA is not granting a national capacity variance for them.

(h) K015 Wastes. EPA is revoking the no land disposal based on no generation standard previously promulgated for K015 (benzyl chloride distillation wastes) nonwastewaters because of the reported generation of ash containing this waste. Consequently, for K015 nonwastewaters, EPA is promulgating concentration standards for five organic and two metal constituents based on incineration followed by stabilization. Sufficient capacity exists to treat this waste; therefore, EPA is not granting a national capacity variance for K015 nonwastewaters.

(i) K017 and K073 Wastes.

K017—Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin

K073—Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production

In today's rule, EPA is promulgating final treatment standards for K017 and K073 wastewaters and nonwastewaters. Concentration standards for the wastewater and nonwastewater forms of these wastes are based on incineration. Sufficient capacity exists to treat these wastes. Therefore, EPA is not granting a national capacity variance for K017 and K073 wastes.

(j) K021 Wastes.

K021—Aqueous spent antimony catalyst from fluoromethane production

Concentration standards are being promulgated today for wastewater and nonwastewater forms of K021 based on incineration. EPA is also promulgating concentration standards for antimony nonwastewaters based on stabilization and antimony wastewaters based on chemical precipitation. Sufficient capacity exists to treat these wastes. Therefore, EPA is not granting K021 wastes a national capacity variance.

(k) K022, K025, K026, K035, and K083 Wastes. EPA is promulgating treatment standards for K022 wastewaters and all forms of K025, K026, K035, and K083 wastes. Treatment standards being promulgated today for K025 and K083 would replace current treatment standards of "No Land Disposal Based on No Generation" that were promulgated in prior rules.

For organics contained in K022, K035, and K083 wastewaters, EPA is promulgating concentration standards based on: biological treatment, or steam stripping, or carbon adsorption, or liquid extraction. Concentration standards promulgated for metals in K022 and K083 wastewaters are based on chemical precipitation. For organics in K035 and K083 nonwastewaters, EPA is promulgating concentration standards based on incineration. For metals in K083 nonwastewaters, EPA is promulgating concentration standards based on stabilization of incinerator ashes.

For K025 and K026, EPA is promulgating incineration as the method of treatment for wastewaters and nonwastewaters. In addition, EPA is also promulgating liquid-liquid extraction followed by steam stripping followed by carbon adsorption as an alternative method of treatment for K025 wastewaters.

EPA has determined that adequate capacity exists for K022 wastewaters, and the wastewater and nonwastewater forms of K025, K026, K035, and K083. Therefore, EPA is not granting a national capacity variance for these wastes.

(l) K028, K029, K095, and K096 Wastes.

K028—Spent catalyst from hydrochlorinator reactor in the production of 1,1,1-trichloroethane
K029—Waste from the product steam stripper in the production of 1,1,1-trichloroethane
K095—Distillation bottoms from the production of 1,1,1-trichloroethane
K096—Heavy ends from the heavy ends column from the production of 1,1,1-trichlorethane

Treatment standards based on incineration were promulgated for K028 wastewaters and nonwastewaters and the nonwastewaters forms of K029, K095, and K096 in the Second Third rule. Today, EPA is promulgating concentration standards for organics in K029, K095 and K096 wastewaters based on incineration. EPA is also promulgating concentration standards for metal constituents in K028 nonwastewaters based on stabilization. Sufficient capacity exists to treat these wastes. Therefore, EPA is not granting a national capacity variance for K028, K029, K095 and K096.

(m) K032, K033, K034, K041, K097, and K098 Wastes.

K032—Wastewater treatment sludge from the production of chlordane
K033—Wastewater treatment scrubber water from the chlorination of cyclopentadiene in the production of chlordane
K034—Filter solids from filtration of hexachlorocyclopentadiene in the production of chlordane
K041—Wastewater treatment sludge from the production of toxaphene
K097—Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane
K098—Untreated process wastewater from the production of toxaphene

For K032, K033, K034, K041, K097, and K098 wastewaters and nonwastewaters, EPA is promulgating concentration standards based on incineration. Sufficient capacity exists for treatment of these wastes; therefore, EPA is not granting a national capacity variance for them.

(n) K036 and K037 Wastes. EPA promulgated a treatment standard of "no land disposal based on no generation" for K036 nonwastewaters in the First Third rule. EPA also promulgated concentration standards based on incineration for K037 wastewaters and nonwastewaters in the First Third rule. Today, EPA is revising these treatment standards for the nonwastewater form of K036 (still bottoms from toluene reclamation distillation in the production of disulfoton) and the wastewater form of K037 (wastewater treatment sludges from the production of disulfoton). Today, EPA is promulgating concentration standards for K036 nonwastewaters based on incineration. EPA believes that adequate capacity exists for these surface-disposed K036 nonwastewaters. Therefore, EPA is not granting a national capacity variance for them.

For K037 wastewaters, EPA is revising the concentration standard from one based on rotary kiln incineration to one based on biological treatment. EPA believes that adequate capacity exists for surface-disposed K037 wastewaters; therefore, EPA is not granting a national capacity variance for them.

(o) K042, K085, and K105 Wastes.

K042—Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T
K085—Distillation of fractionation column bottoms from the production of chlorobenzenes
K105—Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes

For K042, K085, and K105 wastewaters and nonwastewaters, EPA is promulgating concentration standards based on incineration. Sufficient capacity exists for treatment of these wastes; therefore, EPA is not granting a national capacity variance for them.

(p) K044, K045, K046, K047 Wastes. For K044, K045, and K047, EPA is revoking the "no land disposal" standard promulgated in the First Third rule. EPA is promulgating deactivation as the method of treatment for wastewaters and nonwastewaters. EPA has determined adequate capacity exists to treat these wastes; therefore, EPA is not granting a national capacity variance for them.

Today, EPA is promulgating concentration standards for K046 reactive nonwastewaters based on deactivation followed by stabilization. For K046 reactive wastewaters, EPA is promulgating concentration standards based on deactivation and chemical precipitation. Deactivation includes chemical reduction or detonation. In the First Third rule, EPA promulgated treatment standards based on stabilization for K046 nonreactive nonwastewaters. For K046 nonreactive wastewaters, EPA is promulgating concentration standards based on deactivation followed by chemical precipitation. EPA has determined that adequate capacity exists for these wastes. Therefore, EPA is not granting them a national capacity variance.

(q) Petroleum Refining Wastes (K048–K052). EPA is promulgating treatment standards for organic constituents and cyanides in K048–K052 based on data from incineration, solvent extraction. For the metals in K048–K052, EPA is promulgating treatment standards based on stabilization and chemical precipitation. EPA is not revising the promulgated BDAT treatment standards for organic or metal constituents in K048–K052 wastewaters, nor for cyanide in nonwastewaters. In addition, today's rule deletes the treatment standards proposed for arsenic and selenium in nonwastewater forms of K048–K052 based on stabilization. Today's rule also promulgates revised treatment

standards for nickel and total chromium in nonwastewater forms of K048–K052 based on stabilization.

The TSDR Survey indicates that 642,000 tons of K048–K052 will require treatment capacity (i.e., will be displaced from land disposal and will require treatment). EPA recognizes, however, that this information is dated, and to this end undertook to obtain as current an assessment of demand for treatment capacity as possible.

Based on informal contact with the petroleum industry trade association, it appears that the industry may be able to manage approximately three quarters of these wastes on-site after August 1990, in ways not involving land disposal (primarily in-house incineration, use as fuel, or use in coking). (This figure is based on an informal survey of 93 API member companies and assumes that none of the pending no migration petitions for land treatment units will be granted. However, this estimate does not account for the uncertainty and timing of constructing and obtaining permits for on-site disposal/treatment facilities.) Therefore, assuming best case (i.e., on-site capacity is available), this results in approximately 161,000 tons per year of wastes that will require alternative treatment capacity.

EPA estimated that 100,000 tons of capacity for treatment of K048–K052 wastes existed in the form of solids incineration capacity and fuel substitution capacity (these wastes are suitable for use as alternative fuels in industrial furnaces provided that they are dewatered first). There is very little commercial solvent extraction capacity presently on-line. (EPA knows of some small volume mobile solvent extraction units being utilized in California, but these units provide limited volumetric treatment capacity.) Thus, based on these data, there would be a capacity shortfall of approximately 60,000 tons as of May 8.[5]

However, EPA is aware of one large commercial incinerator which could come on line after May 8 that could provide additional substantial volumes of capacity (60,000 tons of new annual capacity in addition to the 100,000 tons of existing capacity) for K048–K052 wastes. This facility is presently seeking a no-migration variance from EPA regarding disposal of scrubber water into a deep injection well. If the petition is granted, this facility would provide sufficient capacity to accommodate treatment demand posed by petroleum wastes. A final decision on the no-migration petition is expected within the next six weeks. (There could still be short-term logistic difficulties associated with getting wastes to the facility and the facility coming on-line that could prevent immediate utilization of this capacity, however.)

EPA also recently became aware (within the last two weeks) of additional solids incineration capacity which is presently available that would provide significant additional treatment capacity for petroleum wastes. This technology, however, requires that wastes undergo a specialized dewatering pretreatment step. The treatment company presently has two mobile dewatering pretreatment units and (according to its estimates) can add two additional dewatering units every three months. This limited amount of pretreatment equipment (there are approximately 190 petroleum facilities to be serviced) could create a temporary treatment bottleneck to use the incineration capacity. (This information appears to have been presented to the petroleum industry by the treatment company late in 1989, so that EPA does not see notice and comment problems vis-a-vis the petroleum industry in relying on the information in this rulemaking.)

Based on this information, EPA has decided to grant a six-month national capacity variance for these wastes, lasting until November 7, 1990. (This effectively extends the industry's prohibition compliance date three months from the date established in the first third rulemaking). EPA believes that by this date, there will be adequate pretreatment capacity as well as incineration and fuel substitution capacity to satisfy demand. There also may be solvent extraction capacity available by that date, although there are sharply conflicting estimates in the record of how quickly solvent extraction capacity can be brought on-line. EPA would be unjustified, however, in extending the national capacity variance until solvent extraction capacity is available. See S. Rep. No. 284, 98th Cong. 1st Sess. 19 ("It is not intended that a generating industry * * * could be allowed to continue to have its wastes disposed of in an otherwise prohibited manner solely by binding itself to using a facility which has not been constructed. Thus, when an 'alternate technology' facility is operating at less than maximum capacity, the Administrator should determine that alternative capacity is available * * *"). Thus, EPA's decision today is based on its best estimates of when treatment capacity of any type will be available to accommodate these wastes.

EPA recognizes that these data are not the most precise, in some cases. In addition, EPA is concerned with using data that it obtains at the very end of the rulemaking in making such decisions (albeit these data tend to corroborate other existing information regarding amounts of solids combustion capacity coming on-line). Therefore, based on further information provided to EPA, EPA may amend the capacity extension in today's rule (through use of appropriate rulemaking procedures).

(r) K060 Wastes. Today EPA is revoking the "no land disposal" based on a no generation standard promulgated for K060 nonwastewaters in the First Third rule. Instead, for K060 nonwastewaters, EPA is also promulgating concentration standards based on incineration. EPA is establishing concentration standards for K060 wastewaters based on biological treatment. EPA believes that adequate capacity exists for the volume of surface-disposed K060 wastewaters and nonwastewaters requiring treatment. Therefore, EPA is not granting a national capacity variance for them.

(s) K061 Wastes. Today, EPA is promulgating concentration standards based on chemical reduction followed by chemical precipitation for K061 wastewaters. EPA believes adequate capacity exists for the volume of surface-disposed K061 wastewaters. Therefore, EPA is not granting a variance for them.

(t) Revisions to K086 Wastes. EPA promulgated concentration standards for K086 solvent washes in the First Third rule based on incineration and stabilization of ash for nonwastewaters, and incineration and chromium reduction followed by chemical precipitation for wastewaters. EPA is promulgating revised concentration standards for all K086 wastewater forms of these wastes based on biological treatment or wet-air oxidation followed by carbon adsorption or chemical oxidation followed by carbon adsorption for organics, chromium reduction followed by chemical precipitation for metals, and alkaline chlorination for cyanides. For nonwastewaters, EPA is promulgating concentration standards based on incineration for organics, followed by stabilization for metals. As a "worst-

[5] It was on the basis of this analysis that EPA senior management tentatively concluded that a one-year national capacity extension might be warranted, which draft determination was communicated to all interested parties by letter late in April, a copy of which is available in the docket. This was not a final EPA decision, however, and EPA continued to monitor the situation. The determianton in the final rule reflects more information than was available to EPA at the time of its tentative determination.

case" analysis, EPA included in the capacity analysis conducted for First Third wastes all of the K086 wastes identified in the TSDR Survey. Consequently, no additional capacity will be required by today's rule, and no capacity variance is being granted for K086 wastes.

(4) *Treatment Standards for U and P Wastes.* Today's rule promulgates treatment standards and capacity determinations for wastewater and nonwastewater forms of U and P wastes (as defined in 40 CFR 261.33 (e) and (f)). Treatment standards and capacity determinations for other U and P wastes that are listed specifically as metal salts or organo-metallics are discussed in previous sections of today's rule. This section also includes a discussion of U and P wastes that have been identified as potentially reactive, primarily as gases, or as cyanogens.

In the proposed rule, EPA grouped all of the U and P wastes into various treatability groups based on (1) similarities in elemental composition (e.g., carbon, halogens, and metals); and (2) the presence of key functional groups (e.g., phenolics, esters, and amines) within the structure of the individual chemical represented. EPA has also accounted for physical and chemical factors that are known to affect the selection of treatment alternatives and to affect the performance of the treatment, such as volatility and solubility, when developing these treatability groups.

While EPA presented the proposed treatment standards and capacity determinations for U and P wastes according to these treatability groups, the promulgated treatment standards and capacity determinations are presented as follows: (a) Concentration-based standards for wastewaters; (b) concentration-based standards for nonwastewaters; (c) technology-based standards for wastewaters; and (d) technology-based standards for nonwastewaters.

(a) Concentration-Based Standards for Specific Organic U and P Wastewaters. EPA is promulgating concentration-based standards for those specific constituents for which the U or P waste is listed. For various reasons, EPA is regulating additional constituents for several U and P wastes.

U and P Wastewaters with Concentration Standards Based on Biological Treatment or Wet-Air Oxidation Followed by Carbon Adsorption

P004, P020, P022, P024, P037, P047 (4,6-Dinitrocresol), P048, P050, P051, P059, P060, P077, P082, P101, P123, U002, U003, U004, U005, U009, U012, U018, U019, U022, U024, U025, U027, U029, U030, U031, U036, U037, U038, U039, U043, U044, U045, U047, U048, U050, U051, U052, U057, U060, U061, U063, U066, U067, U068, U070, U071, U072, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U101, U105, U106, U108, U111, U112, U117, U118, U120, U121, U127, U128, U129, U131, U137, U138, U140, U141, U142, U152, U155, U157, U158, U159, U161, U162, U165, U166, U169, U170, U172, U174, U179, U180, U181, U183, U185, U187, U188, U192, U196, U203, U207, U208, U209, U210, U211, U220, U225, U226, U227, U228, U229, U240, (2,4-D acetic acid), U243, and U247

For these U and P wastewaters, EPA is promulgating concentration standards based on biological treatment, or wet air oxidation followed by carbon adsorption. EPA has identified sufficient capacity for treatment of these wastewaters; therefore, EPA is not granting a national capacity variance for them.

(b) Concentration-Based Standards for Specific Organic U and P Nonwastewaters. EPA is promulgating nonwastewater concentration-based standards for the following U and P wastes, as proposed.

U and P Nonwastewaters with Concentration Standards Based on Incineration

P004, P020, P024, P037, P047, P048, P050, P051, P059, P060, P077, P101, P123, U002, U004, U005, U009, U012, U018, U019, U022, U024, U025, U027, U029, U030, U031, U036, U037, U039, U043, U044, U045, U047, U048, U050, U051, U052, U060, U061, U063, U066, U067, U068, U070, U071, U072, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U101, U105, U106, U108, U111, U112, U117, U118, U120, U121, U127, U128, U129, U131, U137, U138, U140, U141, U142, U152, U155, U157, U158, U159, U161, U162, U165, U169, U170, U172, U174, U179, U180, U181, U183, U185, U187, U188, U192, U196, U203, U207, U208, U209, U210, U211, U220, U225, U226, U227, U228, U239, U240 (2,4-D acetic acid), U243, and U247

For all of these specific organic U and P nonwastewaters, EPA has identified sufficient incineration capacity to treat these nonwastewaters; therefore, EPA is not granting a national capacity variance for them.

(c) Technology-Based Standards for Specific Organic U and P Wastewaters. EPA is promulgating technology-based treatment standards (i.e., methods of treatment) rather than concentration-based constituent specific standards for these wastes. EPA is promulgating wet-air oxidation followed by carbon adsorption or chemical oxidation followed by carbon adsorption or incineration as methods of treatment. Organic U and P wastes technology-based standards are indicated below:

U and P Wastewaters With (Wet-Air Oxidation, or Chemical Oxidation), Followed By Carbon Adsorption; or Incineration as Methods of Treatment

P001, P002, P003, P005, P007, P008, P014, P016, P017, P018, P023, P026, P027, P028, P034, P042, P045, P046, P047 (4,6-dinitrocresol salts), P049, P054, P057, P058, P064, P066 P067, P069, P070, P072, P075, P084, P088, P093, P095, P102, P108, P116, P118, U001, U006, U007, U008, U010, U011, U014, U015, U016, U017, U020, U021, U026, U033, U034, U035, U041, U042, U046, U049, U053, U055, U056, U059, U062, U064, U073, U074, U085, U089, U090, U091, U092, U093, U094, U095, U097, U110, U113, U114, U116, U119, U122, U123, U124, U125, U126, U130, U132, U143, U147, U148, U149, U150, U153, U154, U156, U163, U164, U166, U167, U171, U173, U176, U177, U178, U182, U184, U186, U191, U193, U194, U197, U200, U201, U202, U206, U213, U218, U219, U222, U234, U236, U237, U238, U240 (2,4-D salts and esters), U244, and U248.

EPA has identified sufficient capacity for these organic U and P wastewaters. Therefore, EPA is not granting a national capacity variance for them.

(d) Technology-Based Standards for Specific Organic U and P Nonwastewaters. EPA is promulgating the proposed technology-based standards for the following organic U and P wastes.

U and P Nonwastewaters With Incineration as the Method of Treatment

P002, P007, P008, P014, P016, P017, P018, P022, P023, P026, P027, P028, P034, P042, P045, P046, P047 (4,6-dinitrocresol salts), P049, P054, P057, P058, P064, P066, P067, P069, P070, P072, P075, P082, P084, P093, P095, P108, P116, P118, U003, U006, U007, U010, U011, U014, U015, U017, U020, U021, U026, U033, U034, U035, U038, U041, U042, U046, U049, U057, U059, U062, U073, U074, U091, U092, U093, U095, U097, U110, U114, U116, U119, U130, U132, U143, U148, U149, U150, U153, U156, U163, U164, U167, U168, U171, U173, U176, U177, U178, U184, U191, U193, U194, U200, U202, U206, U218, U219, U222, U234, U236, U237, U238, U240 (Salts and esters), U244

Incineration or Fuel Substitution as Methods of Treatment

P001, P003, P005, P088, P102, U001, U008, U016, U053, U055, U056, U064, U085, U089, U090, U094, U113, U122, U123, U124, U125, U126, U147, U154, U166, U182, U186, U197, U201, U213, U248

EPA has identified sufficient capacity for all of these U and P nonwastewaters. Therefore, EPA is not granting a national capacity variance for them.

(5) *Potentially Reactive P and U Wastes.* This subgroup includes the following waste codes:

P006—Aluminum phosphide
P009—Ammonium picrate

P015—Beryllium dust
P056—Fluorine
P068—Methyl hydrazine
P073—Nickel carbonyl
P081—Nitroglycerin
P087—Osmium tetroxide
P096—Phosphine
P105—Sodium azide
P112—Tetranitromethane
P122—Zinc phosphide (<10%)
U023—Benzotrichloride
U086—N,N-Diethylhydrazine
U096—a,a-Dimethyl benzyl hydroperoxide
U098—1,1-Dimethylhydrazine
U099—1,2-Dimethylhydrazine
U103—Dimethyl sulfate
U109—1,2-Diphenylhydrazine
U133—Hydrazine
U134—Hydrofluoric acid
U135—Hydrogen sulfide
U160—Methyl ethyl ketone peroxide
U189—Phosphorus sulfide
U249—Zinc phosphide (<10%)

These wastes either are highly reactive or explosive or are polymers that also tend to be highly reactive. For the purpose of BDAT determinations, EPA has identified four subcategories: incinerable reactive organics and hydrazine derivatives (P009, P068, P081, P105, P112, U023, U086, U096, U098, U099, U103, U109, U133, and U160); incinerable inorganics (P006, P096, P122, U135, U189, and U249); fluorine compounds (P056 and U134); and recoverable metallic compounds (P015, P073, and P087). For incinerable reactive organics and hydrazine derivatives, EPA is promulgating incineration, fuel substitution, chemical oxidation, or chemical reduction as methods of treatment for nonwastewaters, and incineration, chemical oxidation, chemical reduction, carbon adsorption, or biodegradation as methods of treatment for wastewaters. Because EPA has determined that sufficient treatment capacity exists for the small volume of surface-disposed incinerable reactive organic hydrazine derivates (P009, P068, P081, P105, P112, U023, U086, U096, U098, U099, U103, U109, U133, U160, and U186), EPA is not granting a national capacity variance for them.

For all incinerable inorganic nonwastewaters, EPA is promulgating incineration, chemical oxidation, or chemical reduction as methods of treatment. For wastewaters, EPA is promulgating incineration, chemical oxidation, or chemical reduction as methods of treatment. EPA has determined that sufficient treatment capacity exists for the small volume of surface-disposed incinerable inorganic wastes; therefore, EPA is not granting a national capacity variance for them.

For fluorine compounds nonwastewaters, EPA is promulgating adsorption followed by neutralization as the method of treatment for P056 nonwastewaters, and neutralization or adsorption, followed by neutralization as methods of treatment for U134 nonwastewaters. For P056 and U134 wastewaters, EPA is promulgating concentration standards based on chemical precipitation. EPA believes that adequate treatment capacity exists for these wastes; therefore, EPA is not granting a capacity variance for them.

In the proposed rule, EPA proposed recovery as the method of treatment for P015 wastes. During the comment period, EPA received one comment concerning P015 beryllium recovery, and EPA verified that beryllium recovery capacity does exist. Because EPA has determined that sufficient capacity exists for P015 wastes, EPA is not granting a variance for these wastes. For P073 wastewaters, EPA is promulgating concentration standards based on incineration or chemical oxidation; for P073 nonwastewaters, EPA is promulgating concentration standards based on stabilization. EPA has determined that there is enough capacity available to treat P073 wastewaters and nonwastewaters; therefore, EPA is not granting a capacity variance for them. For P087 wastewaters and nonwastewaters, EPA is promulgating recovery as the method of treatment. EPA has determined that there is not sufficient treatment capacity for P087 wastewaters and nonwastewaters, and is granting these wastes a national capacity variance.

(6) *Gases.* This treatability group includes the following groups: P076 (Nitric oxide), P078 (Nitrogen dioxide), and U115 (Ethylene oxide). For P076 and P078 wastewaters and nonwastewaters, EPA is promulgating venting into a reducing medium as the method of treatment. For U115, EPA is promulgating thermal or chemical oxidation as methods of treatment for nonwastewaters, and incineration, or chemical oxidation followed by carbon adsorption, or wet-air oxidation followed by carbon adsorption as methods of treatment for wastewaters. Because no volumes of P076, P078, and U115 were reported as surface disposed in the TSDR survey, EPA is not granting a national capacity variance for them.

(7) *U and P Cyanogens.* For the U and P wastes containing cyanide, P031 (Cyanogen), P033 (Cyanogen chloride), and U246 (Cyanogen bromide), EPA is promulgating incineration, chemical oxidation, or wet-air oxidation as methods of treatment for both wastewaters and nonwastewaters. EPA has determined that sufficient capacity exists to treat these wastes; therefore, EPA is not granting a national capacity variance for them.

(8) *Capacity Determination for Multi-Source Leachate.* (a) Definition and Applicability. EPA defines multi-source leachate as leachate that is derived from the treatment, storage, disposal, or recycling of more than one listed hazardous waste. Under today's final rule, such leachate will be restricted from land disposal. Residues from treating such leachate, as well as residues such as soil and groundwater that are contaminated by such leachate, are also restricted from land disposal under this rule. Leachate derived from a single source must meet the standard developed for the waste code from which it is derived; therefore, such leachate is not subject to the standards developed for multi-source leachate.

(b) *Previous Treatment Standards.* EPA imposed land disposal prohibitions on multi-source leachate in the Solvents and Dioxins, California list, and First Third rulemakings. In the First Third rule, multi-source leachate would have to be treated to satisfy all the standards applicable to the original wastes from which the leachate is derived (see 53 FR 31146–150 (August 17, 1988)). EPA revisited the issue of treatability of multi-source leachate to address concerns raised by the hazardous waste management industry, and rescheduled promulgation of a land disposal restriction for multi-source leachate to the Third Third rule in order to fully study the most appropriate section 3004(m) treatment standards for multi-source leachate and to reevaluate the issue of available treatment capacity (see 54 FR 8264 (January 27, 1989)).

(c) Final Treatment Standards. In today's rule, EPA is promulgating one set of wastewater and one set of nonwastewater treatment standards for multi-source leachate; these standards would apply to residuals derived from the storage, treatment, or disposal of multi-source leachate. For treating multi-source leachate in the form of wastewater, EPA is promulgating concentration standards primarily based on biological treatment followed by chemical precipitation, or wet-air oxidation followed by carbon adsorption followed by chemical precipitation for organic and inorganic constituents. For nonwastewaters, EPA is promulgating concentration standards based on incineration for organic constituents and on stabilization for metals.

(d) Volumes Requiring Alternative Treatment or Recovery Capacity. EPA relied on data from the TSDR Survey, the Generator Survey, and other capacity data to determine whether sufficient alternative treatment or

recovery capacity is available for multi-source leachate.

Multi-source leachate is primarily generated in landfills. However, EPA recognizes that multi-source leachate can also be generated at closed facilities. Because only sparse data exist on such leachate, EPA requested comments on the characterization of multi-source leachate at closed facilities and on the volume of treated leachate that is presently land-disposed in surface disposal units. EPA also requested the submission of current data from interested parties on the volumes of multi-source leachate generated, the current management of such leachate, the amount of residuals generated, and the waste constituent composition of multi-source leachate.

Several commenters suggested that EPA has underestimated required capacity for multi-source leachate because leachate from closed landfills and ground water from corrective actions and CERCLA cleanups were not considered. EPA did not obtain adequate data to quantify the volumes of such leachates and leachate treatment residuals that might be surface disposed. These surface-disposed volumes, however, are not expected to affect the national capacity variance determination.

In addition to data from the TSDR and Generator Surveys, EPA examined data submitted as part of a leachate study plan by four major companies managing hazardous wastes at 17 facilities. EPA evaluated this information to estimate the volume of multi-source leachate requiring alternative treatment.

(e) Determining National Variances for Multi-Source Leachate. EPA analyzed the alternative treatment or recovery capacity for two categories of multi-source leachate: wastewaters and nonwastewaters.

Most multi-source leachate is managed in wastewater treatment systems and discharged via an NPDES permit and/or to a POTW. EPA estimates that over 41 million gallons of multi-source leachate nonwastewater residues are surface disposed.

Given the low volumes of surface-disposed multi-source leachate wastewaters and the adequate capacity to treat these wastes, EPA proposed and has decided not to grant a national capacity variance for surface-disposed multi-source leachate wastewaters. For multi-source leachate nonwastewaters, EPA is finalizing its proposal to grant a two-year national capacity variance for these wastes, because there is insufficient incineration capacity.

Most commenters agreed with the proposed variance for surface-disposed multi-source leachate nonwastewaters. However, a few commenters requested a national capacity variance for surface-disposed multi-source leachate wastewaters. However, commenters did not provide evidence of surface-disposed volumes of multi-source leachate wastewaters. EPA did not revise the estimates of wastewater volumes because no data were provided showing volumes of multi-source leachate wastewaters that are surface-disposed. Also, as noted above, this surface disposal must involve retrofitted surface impoundments, under RCRA section 3005(j), which ordinarily are section 3005(j)(11) impoundments. Therefore, there should be little additional demand for capacity for displaced leachate wastewaters. Commenters did not dispute this analysis.

(9) *Capacity Determination for Mixed Radioactive Wastes.* (a) Background. EPA has defined a mixed RCRA/radioactive waste as any matrix containing a RCRA hazardous waste and a radioactive waste subject to the Atomic Energy Act (53 FR 37045, 37046, September 23, 1988). Regardless of the type of radioactive constituents that these wastes contain (e.g., high-level, low-level, or transuranic), they are subject to the RCRA hazardous waste regulations, including the land disposal restrictions.

Radioactive wastes that are mixed with spent solvents, dioxins, or California list wastes are subject to the land disposal restrictions already promulgated for those hazardous wastes. EPA has determined, however, that radioactive wastes that are mixed with First Third and Second Third wastes will be included in the Third Third rulemaking (40 CFR 268.12(c)). Thus, today's rule addresses radioactive wastes that contain First Third, Second Third, and Third Third wastes.

(b) Data Sources. The Department of Energy (DOE) is a major generator of mixed RCRA/radioactive wastes. For data on DOE wastes, EPA used a data set submitted by DOE. This data set is based on a recent DOE survey and contains information on mixed RCRA/radioactive waste inventories, generation rates, and existing and planned treatment capacity at 21 DOE facilities.

A variety of non-DOE facilities also generate mixed RCRA/radioactive wastes, including nuclear power plants, academic and medical institutions, and industrial facilities. A variety of information sources were used to identify the non-DOE generators, estimate the quantities and types of mixed RCRA/radioactive wastes that they generate, and determine current management practices and treatment capacity. These sources included the TSDR Survey, the Generator Survey, and other studies. EPA believes that these sources provide available information on non-DOE mixed RCRA/radioactive wastes.

(c) Determining National Variances for Mixed RCRA/Radioactive Wastes. After investigating the data sources noted above, EPA estimated that approximately 393 million gallons of radioactive waste mixed with First, Second, and Third Third wastes will require treatment. Contaminated soil and debris accounts for 193 million gallons of this total, which also includes wastes generated annually as well as untreated wastes in storage. Although DOE is in the process of increasing its capacity to treat mixed RCAR/radioactive wastes, data supplied by DOE indicate a current capacity shortfall for the treatment of First, Second, and Third Third mixed RCRA/radioactive wastes. DOE indicated a stabilization capacity of approximately 2.8 million gallons and a neutralization capacity of approximately 400,000 gallons. The data, however, showed significant alternative treatment capacity shortfalls for all treatment technologies, including stabilization and neutralization. EPA's investigation of non-DOE data sources showed a significant lack of commercial treatment capacity as well. Although one facility was identified that manages a specific type of mixed RCRA/radioactive waste, data sources indicate a lack of sufficient treatment capacity for all treatment technologies. Thus, EPA has determined that sufficient alternative treatment capacity is not available and is granting a two-year national capacity variance for mixed RCRA/radioactive waste wastewaters and nonwastwaters.

One commenter indicated that the proposed two-year national capacity variance is unlawfully and unnecessarily broad, and that EPA should grant variances only for specific waste streams. EPA disagrees with this statement. The capacity analysis was based on detailed, stream-specific data supplied by DOE as well as the best available non-DOE data sources. Although sufficient treatment capacity may exist at certain facilities for certain mixed RCRA/radioactive wastes, EPA's capacity analysis methodology is designed to assess available treatment capacity at the national level. (See RCRA section 3004(h)(2).) EPA believes the capacity analysis performed demonstrates a mixed RCRA/radioactive waste capacity shortfall for

all alternative treatment technologies at the national level.

The same commenter indicated that EPA must determine that available treatment capacity existing for non-radioactive RCRA hazardous waste is inappropriate for mixed RCRA/radioactive wastes. EPA believes that the lack of commercial mixed RCRA/radioactive waste treatment capacity was sufficiently demonstrated in the proposed rule. Not only does the TSDR Survey show a lack of permitted treatment facilities accepting mixed RCRA/radioactive wastes, the most recent data made available by States and State low-level waste compacts support the same conclusion. For the reasons iterated here, EPA believes that the national capacity variance for mixed RCRA/radioactive wastes is both necessary and justified. All other commenters addressing the national capacity variance were in support of EPA's proposal.

One commenter raised the question of whether naturally-occurring radioactive materials (NORM) containing RCRA listed or characteristic hazardous wastes fall under the definition of mixed RCRA/radioactive wastes. The question was also raised whether the national capacity variance extends to these materials. EPA believes that because NORM are not regulated by the Atomic Energy Act, these materials do not fall under the definition of mixed RCRA/radioactive wastes. EPA recognizes, however, that insufficient alternative treatment capacity exists to handle these materials. Therefore, EPA is granting a two-year national capacity variance to hazardous wastes mixed with NORM.

EPA recognized that its information for the proposed rule on mixed RCRA/radioactive wastes generated and managed by non-DOE facilities might have been incomplete. Consequently, EPA requested comments by interested parties on the current generation of mixed RCRA/radioactive wastes. Of particular interest to EPA was information on mixtures of radioactive wastes and First, Second, or Third Third waste streams. Although several commenters addressed problems associated with the storage and disposal of mixed RCRA/radioactive wastes, only one commenter indicated that additional data were available. The data confirm the lack of available treatment capacity and the commenter supports the proposed national capacity variance.

2. Determination of Alternative Capacity and Effective Dates for Underground Injected Waste.

Today, EPA is prohibiting the underground injection of virtually all remaining RCRA section 3004(g) wastes, including characteristic wastes, for which no effective dates have been set. EPA is not acting on certain newly listed or newly identified wastes. In the proposed rule, EPA solicited comments on the volumes and characteristics of the wastes represented in this section, as well as any information on the characteristics and volumes of any multi-source leachate that is currently being injected.

EPA received several responses to this request. One commenter submitted data on the volume of U wastes (20,456 gallons) deepwell injected at its facility in 1989. However, this facility has subsequently received approval of its no-migration petition. Another stated that 3.3 million gallons of P and U wastes are underground injected at its facility. The facility has proved, however, that this stream qualified for the mixture rule exception under RCRA section 261.3(a)(2)(iv), and is therefore not considered a hazardous waste. One commenter indicated it was injecting 7,200 tons of D004 waste at one of its facilities. Further, one commenter stated that it was injecting a wastewater containing U115. Additionally, one commenter submitted an underground injection well survey. EPA acknowledges these comments and has incorporated them appropriately into the capacity analysis.

EPA also received comments pertaining to the form of certain wastes. Several commenters indicated that the nonwastewater forms of D002, D003 (reactive cyanide), D007, and K014 were injected and needed to be included in the capacity analysis. EPA agrees that nonwastewaters were not discussed for many deepwell injected wastes and has evaluated these waste forms for the final rulemaking.

a. Effective Date Determinations for Wastes with Treatment Standards in Today's Rule

Consistent with the policy established in previous land disposal restrictions, EPA is restricting on August 8, 1990, the underground injection of all wastes, with treatment standards in today's rule, that are not currently being deepwell-injected. This decision is consistent with the intent of RCRA in moving hazardous wastes away from land disposal and toward treatment. Wastes that are not currently being deepwell-injected are listed in table III.B.2.(a).

The volumes of deepwell-injected wastes that require alternative commercial treatment and/or recycling capacity are presented in table III.B.2.(b). This table does not include wastes that are currently being deepwell-injected by facilities with appropriate on-site alternative treatment technologies for treating the waste.

EPA is establishing effective date determinations for all underground injected wastes in treatability groups. If there is adequate available alternative treatment capacity for all the injected volume in a single treatability group, then every waste in that group will be restricted from underground injection. If there is inadequate available alternative treatment capacity for the injected volume in a single treatability group, then EPA is allocating as much of the available capacity to the wastes requiring treatment. All remaining wastes in the treatability group, for which no capacity exists, will receive a two-year national capacity variance. EPA believes that this is most consistent with Congressional intent, which favors both treatment over disposal and minimal use of capacity variances. EPA specifically solicited comments on this approach; however no comments were received during the public comment period.

EPA recognizes that the effective prohibition date of the Third Third rule will critically affect the management of large volumes of wastes disposed of on-site in injection wells at a number of facilities. On-site injection wells are characterized by direct piping of wastes from plant operations to the injection facility. In contrast, off-site injection facilities receive manifested wastes from other plant operations which are transported directly to the injection facility.

The injection wells at on-site facilities are directly connected to the plant operations and, all totaled, handle at least five billion gallons of hazardous waste per year. In order to realistically meet the treatment requirements for the Third Third rule, the plant managers will need time to make considerable logistical adjustments such as repiping, retooling, and development of transportation networks at the plant operation facility. Therefore, EPA does not believe that treatment capacity is available if there is no feasible way for generators to transport their wastes to the treatment facilities. EPA can legitimately consider the time necessary to do this in determining whether to grant a national capacity variance.

EPA has relied on such logistic factors in prior rulemakings to determine when

capacity is realistically available. EPA notes that these same logistic factors do not appear necessary to warrant any extension for waste sent to off-site commercial injection facilities as those for on-site injection facilities. EPA believes that facilities disposing of wastes through off-site deepwell injection already have these plant adaptations and transportation networks in place, and therefore do not require any extension of the effective date. Consequently, EPA is using its authority under section 3004[h] of RCRA to provide a six-month extension beyond the May 8, 1990 statutory hibition date for all Third Third stes disposed of at on-site injection ilities directly connected to plant erations.

Table III.B.2(c) indicates the amount capacity available for treating derground injected wastes, the mand from these injected wastes on h treatability groups, and which atability groups require capacity iances. More information on EPA's cedure for apportioning treatment pacity in these treatability groups can found in the Third Third Background cument for the treatability groups. A number of the following treatability ups account for relatively small [less n 100,000 gallons/year) amounts of derground injected wastes. EPA ieves that these small streams place le demand on nationwide treatment pacity.

Presented below are the treatment hnologies EPA used in the capacity alysis for all deepwell-injected stes. EPA selected these technologies sed on the BDATs used for ablishing the concentration and hnology based standards being mulgated today. For the capacity alysis, EPA assigned volumes of stes mixed with other wastes to the propriate treatment such that the atment standards for all wastes will met. Consequently, some of the hnologies listed below are treatment ins that include the BDAT used to termine the standard plus another hnology. Table III.B.2.(d) summarizes e wastes for which EPA is granting a o-year national capacity variance for derground injected wastes.

TABLE III.B.2.(a).—WASTES (WITH TREATMENT STANDARDS) THAT ARE NOT UNDERGROUND INJECTED

[Prohibited from Underground Injection on August 8, 1990]

First Third Codes

K004, K008, K015 (nonwastewaters), K017, K021 (wastewaters), K022 (wastewaters), K035, K036 (nonwastewaters), K037 (wastewaters), K044, K045, K046 (reactive nonwastewaters and all wastewaters), K047, K060 (wastewaters), K061 (wastewaters), K069 (CaSO4 nonwastewaters and all wastewaters), K073, K084, K085, K101 (nonwastewaters), K102 (nonwastewaters), K106, P001, P004, P010, P012, P015, P016, P018, P036, P037, P068, P070, P081, P082, P084, P087, P092, P105, P108, P110, P115, P120, P123, U010, U016, U018, U020, U022, U029, U036, U041, U043, U046, U050, U051, U053, U061, U063, U064, U066, U067, U077, U078, U086, U089, U108, U124, U129, U130, U137, U155, U158, U171, U177, U180, U209, U237, U238, U248, U249.

Second Third Codes

K025 (Wastewaters), K028 (wastewaters), K029 (wastewaters), K041, K042, K095 (wastewaters), K096 (wastewaters), K098, K105, P002, P003, P007, P008, P013 (wastewaters), P014, P026, P027, P049, P054, P060, P066, P067, P072, P099, P104, P107, P112, P113, P114, U003, U005, U011, U014, U015, U021, U023, U025, U026, U035, U047, U049, U057, U059, U060, U062, U073, U083, U092, U093, U094, U095, U097, U098, U099, U101, U109, U110, U111, U114, U116, U119, U127, U128, U131, U135, U142, U143, U144, U146, U149, U150, U161, U163, U164, U168, U172, U173, U174, U176, U178, U179, U189, U193, U196, U203, U205, U206, U208, U213, U214, U215, U216, U217, U218.

Third Third Codes

K003, K005 (wastewaters), K006, K007 (wastewaters), K026, K033, K034, K100 (wastewaters), P006, P009, P017, P022, P023, P024, P028, P031, P033, P034, P038, P042, P045, P046, P047, P064, P065, P073, P076, P077, P078, P088, P093, P095, P096, P101, P103, P116, P118, P119, U004, U006, U017, U024, U027, U030, U033, U038, U039, U042, U048, U052, U068, U071, U072, U075, U076, U079, U081, U082, U084, U085, U090, U091, U096, U117, U120, U121, U123, U125, U126, U132, U136, U139, U141, U145, U148, U152, U153, U156, U166, U167, U181, U182, U183, U184, U186, U187, U191, U201, U202, U204, U207, U222, U225, U234, U236, U240, U243, U246, U247.

Newly-Listed Wastes

F025.

TABLE III.B.2.(b).—REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR UNDERGROUND INJECTED WASTES

[million gallons/year]

Waste code	Capacity required for underground injected wastes
First Third Code	
F006	5.0
F019	<0.1
K011	433.2
K013	407.2
K014	131.0
K031	1.1
K086	0.2
P005	<0.1
P011	<0.1
P020	0.1
P048	0.1
P050	0.4
P058	<0.1
P059	0.4
P069	0.1
P102	<0.1
P122	<0.1
U007	0.1
U009	<0.1
U012	0.1
U019	0.8
U031	0.1
U037	<0.1
U044	0.1
U074	<0.1
U103	<0.1
U105	0.1
U115	8.0
U122	0.1
U133	0.1
U134	0.2
U151	0.1
U154	0.3
U157	0.1
U159	<0.1
U185	1.0
U188	0.2
U192	0.1
U200	0.3
U210	1.0
U211	0.1
U219	<0.1
U220	<0.1
U226	0.1
U227	2.7
U228	<0.1
Second Third Code	
K097	<0.1
P057	<0.1
U002	0.1
U008	0.1
U032	<0.1
U070	0.1
U080	2.8
U106	0.1
U138	0.1
U140	1.0
U147	<0.1
U162	0.1
U165	<0.1
U169	0.1
U170	0.3
U239	0.2
U244	<0.1
Third Third Code	
D001	6.9
D002	1924.5
D003	1745.7
D004	10.0
D005	1.3
D006	1.6

Waste code	Capacity required for underground injected wastes
D007	201.2
D008	3.8
D009	1.2
D010	95.2
D011	0.3
D012	2.3
D013	2.3
D014	2.4
D015	2.3
D016	2.3
D017	2.3
F039 [1]	15.1
K002	0.1
K032	<0.1
K083	5.0
P051	<0.1
P056	<0.1
P075	<0.1
U001	0.5
U034	<0.1
U045	<0.1
U055	0.1
U056	<0.1
U112	<0.1
U113	<0.1
U118	<0.1
U160	<0.1
U194	<0.1
U197	0.1

[1] Multi-source leachate.

TABLE III.B.2.(C)—AVAILABLE AND REQUIRED ALTERNATIVE COMMERCIAL TREATMENT (INCLUDING RECYCLING) CAPACITY FOR UNDERGROUND INJECTED WASTES

[millions of gallons/yr.]

Technology	Available capacity	Required capacity	Variance
Acid leaching followed by chemical precipitation	0	<1	Yes.
Alkaline chlorination	1	48	Yes.
Alkaline chlorination followed by chemical precipitation	4	<1	No.
Biological treatment	47	2	No.
Biological treatment followed by chemical precipitation	13	15	Yes.
Chemical oxidation followed by chemical precipitation	21	1,684	Yes.
Chemical oxidation followed by chromium reduction and chemical precipitation	<1	195	Yes.
Chemical precipitation	314	119	No.
Chromium reduction followed by chemical precipitation	9	239	Yes.
Combustion of liquids	219	54	No.
Mercury retorting	<.01	<.02	Yes.
Neutralization	14	1,638	Yes.
Stabilization	305	4	No.
Wet-air oxidation	<1	1,027	Yes.
Wet-air oxidation followed by carbon adsorption	<1	<1	No.

TABLE III.B.2. (d) SUMMARY OF TWO-YEAR NATIONAL CAPACITY VARIANCES FOR UNDERGROUND INJECTED WASTES

Required alternative treatment technology	Waste code	Physical form
Acid leaching followed by chemical precipitation	D009	Low mercury nonwastewater
Alkaline chlorination	D003 [1]	Wastewater/nonwastewater
Chemical oxidation followed by chemical precipitation	D003 [2]	Wastewater/nonwastewater
Chemcial oxidation followed by chromium reduction and Chemical precipitation	D003 [3]	Wastewater/nonwastewater
Chromium reduction followed by chemical precipitation	D007	Wastewater/nonwastewater
Mercury Retorting	D009	High mercury nonwastewaters
Neutralization	D002 [4]	Wastewater/nonwastewater
Wet-air oxidation	K011	Wastewater
	K013	Wastewater
	K014	Wastewater/nonwastewater
Wet-Air oxidation followed by carbon carbon adsorption followed by checmical precipitation; biological treatment followed by chemical precipitation.	F039 [5]	Wastewater

[1] D003 (Cyanides)
[2] D003 (Sulfides)
[3] D003 (Explosives, water reactives, and other reactives)
[4] Deepwell injected D002 liquids with a pH less than 2.0 must meet the California list treatment standards on August 8, 1990.
[5] Multi-source Leachate

(1) *Acid Leaching followed by Chemical Precipitation.* EPA is promulgating concentration standards for low mercury D009 nonwastewaters based on acid leaching followed by chemical precipitation. EPA's data does not differentiate between low and high mercury concentration nonwastewaters. Consequently, for the capacity analysis EPA conducted a worst-case analysis and assigned the volume of deepwell-injected D009 nonwastewaters to both acid leaching followed by chemical precipitation and mercury retorting (the BDAT for the high concentration mercury subcategory).

There is no commercial acid leaching followed by chemical precipitation capacity, therefore, EPA is granting D009 low concentration mercury nonwastewaters a two-year national capacity variance, restricting this waste from underground injection on May 8, 1992.

(2) *Alkaline Chlorination.* Treatment standards based on alkaline chlorination are being promulgated today for D003 (reactive cyanide). (EPA also determined that the standards may be met using wet-air oxidation or electrolytic oxidation.) As shown in table III.B.2.(c), the less than 1 million gallons per year of available capacity are inadequate to address the quantity of hazardous waste annually deepwell-injected requiring this type of treatment.

Therefore, EPA is granting a two-year national capacity variance to D003 (reactive cyanide) wastewaters and nonwastewaters. This waste will be restricted from injection on May 8, 1992.

(3) *Alkaline Chlorination followed by Chemical Precipitation.* Treatment standards based on alkaline chlorination and chemical precipitation are today being promulgated for F006 cyanide wastewaters and F019 wastewaters. As shown in Table III.B.2.(c), the available capacity of 6 million gallons is adequate to treat the quantity of hazardous waste annually deepwell-injected requiring this type of treatment. EPA is prohibiting these wastes from underground injection on August 8, 1990. (For facilities with injection wells directly connected to plant production operations, the effective date is November 8, 1990, as discussed at the beginning of this section).

(4) *Biological Treatment.* For P020, P048, U002, U009, U019, U031, U112, U140, U159, U170, U188, U220, and U239, EPA is promulgating concentration standards based on biological treatment for wastewaters. (EPA also determined that the standards may be met using wet-air oxidation followed by carbon adsorption). Because there is adequate biological treatment capacity for these deepwell injected wastes, EPA is not granting a national capacity variance for them. (For facilities with injection wells directly connected to plant production operations, the effective date is November 8, 1990, as discussed at the beginning of this section.)

(5) *Chemical Oxidation followed by Chemical Precipitation.* EPA is promulgating concentration standards for P122 wastewaters based on chemical oxidation. For the capacity analysis, EPA assigned P122 wastewaters to chemical oxidation followed by chemical precipitation. EPA has determined that adequate capacity exists to treat P122 wastewaters; therefore, EPA is not granting P122 wastewaters a national capacity variance.

EPA is promulgating deactivation as the method of treatment for D003 (sulfides), which includes chemical oxidation. For the capacity analysis, EPA assigned this waste to chemical oxidation followed by chemical precipitation. As indicated in Appendix VI, EPA has identified other technologies for treating these wastes. The aggregate capacity of the additional technologies is still insufficient for treating these D003 wastes. Therefore, EPA is granting a two-year national capacity variance to D003 (sulfide) wastewaters and nonwastewaters. This waste will be restricted from injection on May 8, 1992.

(6) *Chemical Oxidation followed by Chromium Reduction and Chemical Precipitation.* For D003 (explosives, water reactives, and other reactives), EPA is promulgating standards based on deactivation. EPA did not have data in sufficient detail to differentiate between explosives, water reactives and other reactives. Consequently, for the capacity analysis, EPA has grouped these wastes into one group. For the capacity analysis, EPA assigned all volumes to chemical oxidation, chromium reduction, and chemical precipitation. As indicated in Appendix VI, EPA has identified other technologies for treating these wastes. The aggregate capacity of the additional technologies is still insufficient for treating these D003 wastes. Therefore, EPA is granting a two-year national capacity variance to these wastes, restricting D003 (explosives/reactives) wastewaters and nonwastewaters from underground injection on May 8, 1992.

(7) *Chemical Precipitation:* Wastewater forms of D004, D005, D006, D008 (lead-non-battery), D009, D010, D011, F006, K031, P011, P056, U134, and U151 represent those wastes best treated by chemical precipitation. As shown in table III.B.2.(c), the 331 million gallons per year of available chemical precipitation are adequate to treat the quantity of hazardous waste annually deepwell-injected requiring this type of treatment. EPA is prohibiting these wastes from underground injection on August 8, 1990. (For facilities with injection wells directly connected to plant production operations, the effective date is November 8, 1990, as discussed at the beginning of this section).

(8) *Chromium Reduction followed by Chemical Precipitation.* Treatment standards based on chromium reduction and chemical precipitation are today being promulgated for wastewater forms of D007, F006, K002, P011, and UO32. As shown in Table III.B.2.(c), the 32 million gallons per year capacity of available chromium reduction and chemical precipitation is inadequate to treat the quantity of hazardous waste annually deepwell-injected requiring this type of treatment. Excluding D007, however, adequate capacity exists to treat the remaining wastes. Therefore, EPA is granting a two-year national capacity variance to D007 wastewaters and nonwastewaters, prohibiting this waste from underground injection on May 8, 1992. For the remaining wastes, no national capacity variance is being granted.

(9) *Combustion of Liquids.* Combustion of liquids is the standard of treatment for deepwell injected D001 (ignitable liquids), D011, D012, D013, D014, D015, D016, D017, K032, K083, K086, K097, P005, P050, P051, P057, P059, P069, P075, P102, U001, U007, U008, U012, U019, U034, U037, U044, U045, U055, U056, U070, U074, U080, U103, U105, U106, U112, U113, U115, U118, U122, U133, U138, U147, U154, U157, U159, U160, U162, U165, U169, U185, U192, U194, U197, U200, U210, U211, U219, U220, U226, U227, U228, U239, and U244. Although U041, U077, U083, U084, and U213 are also underground injected, because they will be treated on-site, their quantities are not included in required capacity for combustion of liquids. As shown in table III.B.2.(c), the 219 million gallons per year of available capacity are adequate to treat the quantity of hazardous waste annually deepwell-injected requiring this type of treatment. Therefore, these wastes will be restricted from underground injection on August 8, 1990. (For facilities with injection wells directly connected to plant production operations, the effective date is November 8, 1990, as discussed at the beginning of this section).

(10) *Mercury Retorting.* Treatment standards based on mercury retorting are being promulgated for nonwastewaters forms of D009 wastes. As shown in table III.B.2.(c), the less than .01 million gallons per year of available mercury retorting capacity are inadequate to treat the quantity of this waste annually deepwell-injected requiring this type of treatment. EPA is granting a two-year national capacity variance to the nonwastewater forms of D009, restricting this waste from underground injection on May 8, 1992.

(11) *Neutralization.* EPA is promulgating deactivation as the method of treatment for D002 wastewaters and nonwastewaters. For the capacity analysis, EPA assigned all D002 acids and alkalines to neutralization. As indicated in appendix VI, EPA has identified other technologies for treating these wastes. The aggregate capacity of the additional technologies is still insufficient for treating D002 wastewaters and nonwastewaters. Therefore, EPA is granting a two-year national capacity variance for the D002 wastewaters and nonwastewaters, restricting this waste from underground injection on May 8, 1992. Deepwell injected D002 liquids with a pH less than 2.0, which received a two-year national variance in the California list rulemaking, are required

to meet the California list treatment standards on August 8, 1990.

(12) *Stabilization.* For residuals containing D005, D006, D007, D008 (lead-non-battery), D011, K002, K083, K086, and U032, stabilization is part of the treatment train. As shown in Table III.B.2.(c), the 265 million gallons per year of available capacity are adequate to treat the quantity of hazardous waste residuals requiring this type of treatment. These residuals will be prohibited from land disposal on August 8, 1990. (For facilities with injection wells directly connected to plant production operations, the effective date is November 8, 1990, as discussed at the beginning of this section.)

(13) *Wet-Air Oxidation.* K011, K013, and K014, represent all of the underground injected hazardous wastes addressed in today's rule that are best treated by wet-air oxidation. As shown in table III.B.2.(c), the less than 1 million gallons of available capacity are inadequate to treat the quantity of K011 wastewaters, K013 wastewaters, and K014 wastewaters and nonwastewaters annually deepwell-injected requiring this type of treatment. Therefore, EPA is granting a two-year national capacity variance to the wastewater forms of K011, K013, and K014, and the nonwastewater form of K014, prohibiting these wastes from underground injection on May 8, 1992.

(14) *Wet-Air Oxidation followed by Carbon Adsorption.* For P058 wastewaters, treatment standards based on wet-air oxidation and carbon adsorption are being finalized today. As shown in Table III.B.2.(c), the less than 1 million gallons of available capacity are adequate to treat the quantity of P058 annually deepwell-injected required this type of treatment; therefore, EPA is not granting a national capacity variance for this waste. (For facilities with injection wells directly connected to plant production operations, the effective date is November 8, 1990, as discussed at the beginning of this section.)

(15) *Biological Treatment followed by Chemical Precipitation or Wet Air Oxidation followed by Carbon Adsorption followed by Chemical Precipitation.* For F039 (multi-source leachate) wastewaters, EPA is promulgating concentration standards based primarily on biological treatment followed by chemical precipitation or wet air oxidation followed by carbon adsorption followed by chemical precipitation. As shown in table III.B.2.(c), the approximately 14 million gallons of available capacity is insufficient to handle the 15 million gallons of required capacity. EPA notes that the 14 million gallons of available capacity is the maximum available, as a portion of this volume is contributed by a facility that was scheduled to come on-line in 1988. EPA was unable to determine whether this facility is currently operating. Because of the lack of available capacity, EPA is granting a national capacity for this waste.

b. Response to Request for Data on Underground Injected K014 Nonwastewaters.

EPA addressed the underground injection of K011 and K013 nonwastewaters in the June 8, 1989, Second Third final rule. In that rule, a two-year national capacity variance was granted due to the lack of alternative incineration capacity (54 FR 26642). Action on K014 nonwastewaters was deferred so that EPA could evaluate information on the composition, characteristics, and volumes associated with this waste. EPA has received information indicating that, by definition, K014 nonwastewaters are being underground injected. Because inadequate wet-air oxidation capacity exists to treat K014 nonwastewaters, EPA is granting a two-year national capacity variance for the underground injection of these wastes, restricting K014 nonwastewaters from underground injection on May 8, 1992.

c. Deepwell Injected Multi-Source Leachate.

Commenters supported the proposed capacity variance for underground injected multi-source leachate. One commenter provided data or additional volumes of multi-source leachate that are underground injected. Consequently, EPA is updating its estimate of the volume of underground injected multi-source leachate by 1.5 million gallons. EPA estimates that at least 15 million gallons of multi-source leachate wastewaters are currently deep-well injected and will require alternative treatment capacity. EPA believes that most multi-source leachate currently underground injected contains both organic and inorganic constituents. EPA is promulgating concentration standards for wastewaters primarily based on biological treatment followed by chemical precipitation, or wet-air oxidation followed by carbon adsorption followed by chemical precipitation for organic and inorganic constituents. Because there is insufficient capacity to treat wastewaters based on these treatment technologies, EPA is granting a two-year national capacity variance for multi-source leachate that is underground injected. This waste will be prohibited from underground injection on May 8, 1992.

d. Mixed Radioactive Wastes.

EPA requires radioactive wastes mixed with RCRA-regulated solvents and dioxins to meet LDRs and treatment standards established for those solvents and dioxins when mixed with radioactive wastes. EPA currently has no information on mixed radioactive wastes that are underground injected. EPA requested comments on mixed radioactive wastes that are being underground injected. EPA received no information indicating that mixed radioactive wastes were being underground injected; thus, EPA is not granting a national capacity variance for them. These wastes will be prohibited from underground injection on August 8, 1990.

3. Capacity Variances for Contaminated Soil and Debris

Today, EPA is granting an extension of the effective date for certain First, Second, and Third Third contaminated soil and debris for which the treatment standards are based on incineration, vitrification, or mercury retorting; EPA is also granting a national capacity variance for inorganic solids debris contaminated with D004 through D011 wastes. RCRA section 3004(h)(2) allows the Administrator to grant an extension to the effective date based on the earliest date on which adequate alternative capacity will be available, but not to exceed two years ". . . after the effective date of the prohibition which would otherwise apply under subsection (d), (e), (f), or (g)." For First third and Second Third wastes that have heretofore been subject to the "soft hammer" provisions (see section I.B.9) but for which treatment standards are being promulgated today, EPA is interpreting the statutory language " * * * effective date of the prohibition that would otherwise apply" to be the date treatment standards are promulgated for these wastes (i.e., May 8, 1990), rather than the date on which the "soft hammer" provisions took effect (i.e., August 8, 1988, and June 8, 1989, respectively). EPA finds this the best interpretation for two reasons. Extensions of the effective date are based on the available capacity of the BDAT for the waste, so it is reasonable that such an extension begin on the date on which treatment standards based on performance of the BDAT are established. Furthermore, EPA does not intend, in effect, to penalize generators of First Third and Second Third wastes by allowing less time (i.e., 28 months and 37 months, respectively) for the development of needed capacity, while

generators of Third Third wastes in the same treatability group are allowed the maximum 48 months (assuming capacity does not become available at an earlier date). The capacity extension will therefore commence for First, Second, and Third Third wastes on May 8, 1990, and would extend (at maximum) until May 8, 1992.

For the purpose of determining whether a contaminated material is subject to this capacity extension, "soil" is defined as materials that are primarily geologic in origin, such as silt, loam, or clay, and that are indigenous to the natural geological environment. In certain cases, soils will be mixed with liquids or sludges. EPA will determine on a case-by-case basis whether all or portions of such mixtures should be considered soil (52 FR 31197, November 8, 1986).

Debris is generally defined as materials that are primarily non-geologic in origin, such as grass, trees, stumps, shrubs, and man-made materials (e.g., concrete, clothing, partially buried whole or crushed empty drums, capacitors, and other synthetic manufactured items). Debris may also include geologic materials (1) identified as not indigenous to the natural environment at or near the site, or (2) identified as indigenous rocks exceeding a 9.5-mm sieve size that are greater than 10 percent by weight, or that are at a total level that, based on engineering judgment, will affect the performance of available treatment technologies. In many cases, debris will be mixed with liquids or sludges. EPA will determine on a case-by-case basis whether all or portions of such mixtures should be considered debris.

In addition, EPA has established a specific treatability group for inorganic solids debris contaminated with D004 through D011 wastes. Wastes in this treatability group are defined as follows: nonfriable inorganic solids that are incapable of passing through a 9.5-mm standard sieve that require crushing, grinding, or cutting in mechanical sizing equipment prior to stabilization, limited to the following inorganic or metal materials: (1) Metal slags (either dross or scoria); (2) glassified slag; (3) glass; (4) concrete (excluding cementitious or pozzolanic stabilized hazardous wastes); (5) masonry and refractory bricks; (6) metal cans, containers, drums, or tanks; (7) metal nuts, bolts, pipes, pumps, valves, appliances, or industrial equipment; and (8) "scrap metal" (as defined in 40 CFR 261.1(c)(6)). EPA has determined that there is inadequate treatment capacity for all debris in this treatability group. Therefore, EPA is granting inorganic solids debris a national capacity variance.

Analysis of the TSDR Survey data indicated that a volume of approximately 17 million gallons of soil and debris contaminated with wastes subject to this rule were land-disposed in 1986. However, the Superfund remediation program has expanded significantly since that time. Plans for remediation at Superfund sites indicate that the excavation of soil and debris requiring treatment (including incineration and subsequent land disposal) will be far greater in 1990 than in 1986. Because of the major increase in the Superfund remediation program, EPA has determined that capacity is not adequate for incineration, vitrification, and mercury retorting of Third Third contaminated soil and debris. In addition, EPA has determined that there is insufficient treatment for inorganic solids debris. Therefore, EPA is granting a two-year national capacity variance for Third Third contaminated soil and debris for which BDAT is incineration, vitrification, or mercury retorting, and all inorganic solids debris.

EPA is also granting a two-year national capacity variance to all soil and debris contaminated with mixed RCRA/radioactive waste. EPA has estimated that insufficient treatment capacity exists to handle soil and debris contaminated with mixed radioactive waste.

EPA notes that if soil and debris are contaminated with Third Third prohibited wastes whose treatment standard is based on incineration (or other technologies for which EPA determines there is insufficient capacity) and also with other prohibited wastes whose treatment standard is based on an available type of technology, the soil and debris would remain eligible for the national capacity variance. This is because the contaminated soil and debris would still have to be treated by some form of technology that EPA has evaluated as being unavailable at present. However, there is one exception to this principle. If the soil and debris are contaminated with a prohibited waste (or wastes) that is no longer eligible for a national capacity extension, such as certain types of prohibited solvent wastes, then the soil and debris would have to be treated to meet the treatment standard for that prohibited waste (or wastes). Any other interpretation would result in EPA's extending the date of a prohibition beyond the dates established by Congress, and therefore beyond EPA's legal authority.

C. Ninety Day Capacity Variance for Third Third Wastes

EPA is delaying the effective date of the treatment standards in today's rule for three months, or until August 8, 1990 (except for those portions of the rule delayed because of long-term national capacity variances). EPA is taking this step because the Third Third rule is of unusual breadth (approximately 350 waste codes affected, plus all characteristic wastes, multi-source leachate, and mixed wastes), complexity, and difficulty. Persons having to comply must not only determine what the treatment standards are for their wastes, but must also grapple with the interplay between standards for listed and characteristic wastes, certain new interpretations regarding permissible and impermissible dilution, and certain new tracking requirements for characteristic wastes. Although the Agency has made all efforts legally available to communicate its resolution of some of these matters in advance of the May 8, 1990, prohibition date, most members of the regulated community are just receiving notice of the requirements with which they must comply. It takes some reasonable amount of time to determine what compliance entails, as well as time to redesign tracking documents, possibly adjust facility operations, and possibly segregate wastestreams which heretofore had been centrally treated. EPA believes that these legitimate delays are encompassable within the concept of a short-term national capacity variance because part of the notion of available capacity is the ability to get wastes to the treatment capacity in a lawful manner. Accordingly, the Agency is granting a short-term national capacity variance for three months.

The Agency emphasizes that during this variance, all Third Third wastes that remain hazardous and that are being disposed of in landfills or surface impoundments may only be disposed of in landfill or impoundment units that meet the minimum technology standards set out in § 268.5(h)(2). (See also section III.D of today's preamble explaining that a different principle holds for prohibited wastes that are now nonhazardous.) In addition, the recordkeeping requirements of existing 40 CFR 268.7 (a)(4) and (b)(6) will apply during this period. These provisions require a certification that a restricted waste is not subject to a prohibition for enumerated reasons, such as existence of a national capacity variance. EPA does not intend, however, that

recordkeeping requirements apply to characteristic wastes that have been treated to meet the treatment standard during this three-month period. The new recordkeeping requirements applicable to these situations in fact do not take effect for three months based on the Agency's determination that it will take that long to understand how to use them. Thus, tracking documents would only be required for restricted wastes that are hazardous wastes when sent off-site. In addition, all existing treatment requirements (e.g., California list requirements applicable during the period of a capacity extension) are applicable from May 8, 1990 to August 8, 1990.

D. Applicability of Land Disposal Restrictions

1. Introduction

Under RCRA, wastes can be designated as "hazardous" in one of two ways: (1) they may be specifically listed based on EPA's evaluation of factors set out in 40 CFR 261 subpart B ("listed wastes"), or (2) they may be considered hazardous because they exhibit certain indicator characteristics set out in 40 CFR part 261 subpart C ("characteristic wastes").

A central issue in this rulemaking concerns EPA statutory authority to require full treatment for characteristic wastes. Some industry commenters argue that EPA lacks jurisdiction over characteristic wastes if the indicator characteristic is removed before land disposal. Environmentalists and the treatment industry, on the other hand, argue that EPA must, in all cases, require treatment of characteristic wastes in the same manner it would for listed wastes. EPA disagrees with both positions. Rather, EPA believes that the statute provides EPA ample authority to determine whether additional treatment beyond removal of the characteristic is necessary for particular types of wastes to achieve the goals of the statute.

In some cases, EPA is requiring additional treatment beyond removing the characteristic; in others, EPA deems removal of the characteristic itself to be sufficient especially where no toxic contaminants are specifically identified; finally, in several cases, EPA has determined that there is only sufficient information in the record to justify treatment requirements to the characteristic levels at this time. For these respective wastes, data in the administrative record is not adequate to determine whether treatment below characteristic levels is feasible to minimize threats to human health and the environment for the wide range of differing waste matrices encompassed by a single characteristic waste code. In these respective cases, EPA is establishing a treatment level based on its best judgment on the information currently available, and will review its decision in light of new information in the future.

Another critical issue is whether or not to prohibit dilution of characteristic wastes as part of the LDR program. As discussed below, in some circumstances a dilution prohibition is important to ensure actual treatment of the waste. EPA is applying a dilution prohibition to wastes which exhibit a characteristic at the point of generation, with two exceptions. The first exception to the dilution prohibition is for characteristic wastes treated for purposes of CWA requirements. CWA requirements, including CWA dilution rules, serve goals similar to the LDR dilution rules. Relying on the CWA dilution rules will generally accomplish the goals of the LDR program without creating potential inconsistencies or duplication in EPA's regulations. A second general exception to the LDR prohibitions is for characteristic wastes that are subsequently diluted and disposed in injection wells authorized under the SDWA. This exclusion is based, in part, on EPA's evaluation that the disposal of dilute, nonhazardous wastes into appropriately confined injection zones would not constitute a threat to human health and the environment. EPA's decision also is based on the unnecessary regulatory burden that would ensue from application of the LDR prohibitions on the SDWA program regulating nonhazardous well disposal. A more detailed discussion of EPA's rationale and decision rules follow.

2. Legal Authority over Characteristic Wastes

a. *Introduction.* One of the most fundamental issues in this rulemaking is whether the prohibition on the land disposal of untreated characteristic wastes applies at the point of generation or at the point of land disposal. The choice of approach will affect EPA's ability to establish methods of treatment (rather than allowing dilution to meet a level), to apply a dilution prohibition, to require treatment of constituents other than those specifically addressed by the characteristic, and to establish treatment levels below characteristic levels.

This issue arises from current regulatory distinctions between characteristic hazardous wastes and listed hazardous wastes. Listed wastes, and wastes derived from the storage, treatment and disposal of listed wastes, remain hazardous for all regulatory purposes unless that waste is specifically delisted by Agency approval of a delisting petition under 40 CFR 260.22. Thus, a listed hazardous waste remains hazardous from the point of generation through the point of land disposal unless specifically delisted.

In contrast, a characteristic hazardous waste is no longer deemed hazardous when it ceases to exhibit a hazardous waste characteristic. 40 CFR 261.3(d)(1). However, as discussed below, the characteristic level is only one indicator of hazard and, thus, removal of the specific characteristic is not the same as assuring that the waste is safe. Until today, a hazardous waste characteristic could be removed by treatment; however, it could also be removed by simple mixing or dilution. Thus, if LDR requirements were applied only to wastes which exhibit a characteristic at the point of land disposal, EPA would be unable to require full treatment or, in some cases, any legitimate treatment of wastes which exhibit a characteristic at the point of generation.

EPA's proposed approach for both treatment standards and applying a dilution prohibition for characteristic wastes received many comments. Most commenters expressed concern about the regulatory impact of these rules on land disposal facilities regulated under RCRA subtitle D. There was particular concern over the impact of the proposed rules on existing wastewater treatment trains regulated under the Pretreatment and National Pollutant Discharge Elimination System (NPDES) programs, pursuant to sections 307(b) and 402 of the CWA, which use surface impoundments not regulated under RCRA subtitle C. In addition, there were many comments concerning the impact of the proposed rules on the SDWA program for nonhazardous injection wells.

As discussed below, Congress has given apparently conflicting guidance on how the Agency should address land disposal prohibitions for characteristic wates. EPA believes it has authority to reconcile these potential conflicts and to harmonize statutory provisions to forge a coherent regulatory system. (See RCRA Section 1006(b)—"The Administrator shall integrate all provisions of (RCRA) for the purposes of administration and enforcement and shall avoid duplication to the maximum extent practicable, with the appropriate provisions of the (CWA and SDWA)".) Within this authority EPA seeks to further the policy of section 3004(m) to treat hazardous waste prior to land disposal. However, EPA may also take

steps to address problems that could arise from integration of LDR prohibitions in the context of the RCRA Subtitle D, CWA and SDWA programs. A more detailed discussion of the legal authority for this approach is provided below.

b. *General Standard for Agency Construction of Statutes.* Chevron U.S.A. Inc. v. NRDC, 467 U.S. 837 (1984) sets forth a two-step process for determining whether to sustain an agency's statutory interpretations. First, a court determines whether Congress has spoken directly to the precise question at issue. If the intent of Congress is clear, then the agency construction must be consistent with the Congressional directive. If, however, the statute is silent or ambiguous with respect to the specific issue, the agency choice must be based on a permissible construction of the statute. The construction may reflect a reasonable accommodation of policies that are committed to the agency by statute.

For the reasons stated below, EPA believes that Congress has not spoken to the precise question of the point at which LDR prohibitions apply and, thus, the Agency may develop a reasonable interpretation of the statute considering the goals and objectives of the LDR program and RCRA in general.

c. *Scope of Agency Authority for Treatment Requirements.* Several industry commenters argue that EPA must determine the applicability of LDR requirements at the point of land disposal based on the language of RCRA section 3004(g), which authorizes EPA to prohibit "the land disposal of hazardous waste." Commenters argue that this language indicates a Congressional decision to apply LDR requirements only to waste which is listed or exhibits a characteristic at the point of land disposal.

The Agency agrees that this is one permissible construction of the language in section 3004(g). Clearly a waste must be "hazardous" to fall under the mandate of 3004(g). EPA could assess whether or not a waste is hazardous at the point of land disposal to determine whether the prohibition in 3004(g) applies. The Agency, however, does not believe this is the only permissible construction. Although section 3004(g) clearly authorizes EPA to prohibit the land disposal of characteristic waste, it does not specify that the status of the waste for purposes of the prohibition can only be evaluated at the point of land disposal. Rather, the evaluation of whether a hazardous waste is subject to the prohibitions can apply at the point of generation or at the point of disposal (and possibly at some other point or combination of the two). Indeed, section 3004(g)(5) requires EPA to consider "* * * the goal of managing hazardous waste in an appropriate manner *in the first instance*," (emphasis added) when determining the scope of the land disposal prohibitions. See reference to section 3004(d)(1)(B) in section 3004(g)(5). This language can be read to refer to a point of generation approach. Moreover, the statutory structure provides for treatment of hazardous waste under section 3004(m) treatment standards *before* land disposal and not necessarily at the physical point of land disposal. Commenters further argue that the Congressional policy is to limit the scope of the LDR provisions to facilities currently regulated under subtitle C of RCRA.

As discussed below, the Agency has concluded that applying LDR requirements at the point of generation is not only a permissible construction of the statute, but one which may better serve the goals and objectives of the LDR program.[6] Specifically, EPA believes that applying LDR requirements at the point of generation may, in some cases, be necessary to effectuate the requirement that the Agency set treatment standards or methods for characteristic wastes under section 3004(m). As the Agency noted in the proposal at 54 FR 48490, the point of disposal approach could undermine the Congressional goals of the land disposal restrictions in critical ways when applied to characteristic wastes.

First, the Agency would not effectively be able to set a particular method of treatment or limit dilution for a characteristic waste. A point of disposal approach might permit dilution of characteristic wastes, since waste diluted below a characteristic level prior to land disposal would not be regulated by LDR provisions. Such dilution could be in lieu of treatment or a specified method and would not fulfill the goals of section 3004(m). In many cases, dilution simply increases the volume of a waste without reducing or immobilizing the mass of hazardous constitutents in the waste.

Second, the point of disposal approach could be construed to limit treatment standards both in terms of treatment levels and the range of hazardous constituents affected by the treatment standard. For characteristic wastes, a point of disposal approach would, in effect, preclude a requirement to treat below the characteristic level. In some cases, characteristic levels are not levels below which there may be no significant risks to human health and the environment. Rather, the EP (and TC) limits are levels at which wastes clearly are hazardous. 45 FR 33084 (May 19, 1980); 51 FR 21648 (June 13, 1986); 55 FR 11798 (March 29, 1990).[7]

Characteristic wastes also may exhibit both a specific characteristic and contain significant concentrations of other hazardous constituents. (This is true, for example, of the high TOC ignitable wastes and reactive cyanide wastes regulated under today's rule.) Simply treating the one specific characteristic which is an indicator that the waste is a hazardous waste would not necessarily fulfill the goal of section 3004(m), *i.e.*, 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" (emphasis added). The statutory focus on hazardous constituents beyond the specific characteristic constituent is also enunciated in sections 3004(d)–(g) of RCRA. These provisions authorize EPA to take into account "* * * the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous wastes *and their hazardous constituents*" in establishing hazardous

[6] The Agency has previously adopted the point of generation approach with respect to identification of waste subject to the California list prohibitions set out in RCRA section 3004(d)(1) and (2). 52 FR 25760 (July 8, 1987). Like characteristic wastes, California list wastes must contain constituents or exhibit a property above a certain level. Moreover, as a general matter, to ensure the proper management of waste in the first instance, EPA has required application of several 40 CFR part 268 requirements at the point of generation. See § 268.30(a)(3) and 52 FR 21012 (June 4, 1987) (initial generator must determine whether solvent wastes are prohibited); 53 FR 31146–47 (August 17, 1988) and 54 FR 26605 (June 23, 1989) (waste code carry-through principle applies at the point of generation and determines both the prohibition and the treatment standard for listed wastes). All land disposal restriction tracking requirements likewise attach at the point of generation. (268.7(a) and 54 FR 36968 (Sept. 6, 1989).

[7] In *Hazardous Waste Treatment Council* v. *EPA* (HWTC III), 886 F.2d 355 (D.C. Cir. 1989) the court noted that it would be inappropriate under section 3004(m) to require treatment below levels which there are no longer threats to human health and the environment. *Id.* at 363. However, the court noted that the inquiry under section 3004(m) concerning the extent of treatment is different than levels established for other regulatory purposes, and specifically noted that EPA need not construe characteristic levels as levels below which no further minimization of threats can occur. *Id.* at 362. The Agency has recently discussed its rationale for a technology-based approach to treatment standards under section 3004(m) which does not cap the treatment requirements at delistings levels. (See 55 FR 6640, (February 26, 1990). EPA recognizes that *HWTC III* is not dispositive on the issue we address today whether characteristic levels at the point of disposal serve as a jurisdictional bar to application of section 3004(m) treatment standards.

waste prohibitions. Section 3004(d)(1)(C) (emphasis added). Thus, EPA believes it has statutory authority to take into account all aspects of a waste stream in determining appropriate treatment and is not limited to considering merely one specific "characteristic" that indicates that the waste is hazardous in the first instance.

EPA also has general authority under RCRA section 3004 (a)(3) to establish different criteria for determining when wastes will enter and exit the hazardous waste management system—*i.e.*, when they will initially be designated as hazardous waste and when they no longer require RCRA subtitle C management controls. For example, the clean-closure standards for regulated units that hold characteristic wastes require removal of hazardous constitutents even if the waste no longer exhibits a hazardous characteristic. See 53 FR 8705 (March 19, 1987). EPA also has previously promulgated regulations requiring that incinerators treating hazardous waste be operated to a certain efficiency even if a characteristic waste in the waste feed ceases to exhibit a characteristic somewhere in the combustion process.

EPA believes that under the first test in *Chevron*, Congress has neither mandated nor precluded a point of generation approach. In this case the "meaning or reach of a statute involve[s] reconciling conflicting policies." *Chevron*, 467 U.S. at 846 (citation omitted). Moreover, "a full understanding of the force of the statutory policy in the given situation has depended upon more than ordinary knowledge respecting the subject matters subjected to agency regulations." *Id.* Accordingly, EPA should make choices which represent "a reasonable accommodation of conflicting policies that were committed to the agency's care by statute." *Id.*

In this regard, section 1006(b) of RCRA provides EPA authority to integrate provisions of RCRA and other acts it administers, including the CWA and SDWA, for purposes of administration and enforcement. Such integration must be consistent with the goals and policies of these acts. Under this framework, EPA can analyze potential overlaps between regulatory programs in its decision-making. Where the goals are consistent, and uniform administration or enforcement is preferable, EPA may rely on one regulatory framework instead of applying potentially duplicative or inconsistent regulations. Accordingly, the Agency believes that it can harmonize potentially conflicting policies by considering both the benefits of a given approach and any regulatory problems (including regulatory overlap) that would be engendered by the approach. The balancing may thus result in different application of LDR requirements for certain classes of facilities.

d. *Agency Framework for Addressing Treatment Standards for Characteristic Wastes and Integrating them With Other Regulatory Programs.* The Agency believes that it has authority to apply LDR requirements at the point of waste generation for characteristic wastes and that such an approach will generally better achieve the goals of the LDR program. Specifically, EPA believes it has the authority to set treatment levels below the characteristic levels, to specify methods of treatment, and to prohibit dilution for characteristic wastes where necessary and appropriate to further the goals of the statute. EPA recognizes, however, that there are many far-reaching policy considerations respecting the actual implementation of this approach. For example, a point of generation approach could apply to management of waste prior to RCRA subtitle D land disposal.[8]

LDR standards which require waste to be treated to below characteristic levels would apply to wastes currently destined for RCRA subtitle D facilities. Application of the LDR provisions would be a very significant change in the regulatory scheme for these facilities, and could cause major administration and enforcement problems for both EPA and these facilities. For example, EPA currently has no authority to enforce subtitle D criteria against subtitle D facilities, and, hence has no enforcement program for these facilities. In order to ensure that these facilities met the subtitle C requirements, the Agency would have to implement an enforcement scheme that addressed thousands of subtitle D facilities. In addition, owners and operators of subtitle D facilities would need to meet complex LDR tracking requirements. Many may decide not to accept partially treated characteristic wastes rather than comply, thus, diverting potentially large volumes of non-hazardous waste to subtitle C facilities and potentially aggravating capacity problems at subtitle C facilities.[9] As noted in the proposal at 54 FR 48491, some of these problems may be addressed by future regulatory revisions. EPA will continue to evaluate this issue as it addresses standards for the wastes identified by the new Toxicity Characteristic (TC).

In addition, many of these potentially affected subtitle D units contain wastes that are regulated, in part, under the National Pollutant Discharge Elimination System (NPDES) and pretreatment programs under sections 301, 304, 307, and 402 of the CWA, and the Underground Injection Control (UIC) program under the SDWA. Requiring treatment below characteristic levels or imposing a dilution prohibition would require significant changes to the operations of these facilities and create problems of regulatory integration.

This is not to say that the section 3004(m) objectives carry little weight with respect to characteristic wastes. On the contrary, particularly with respect to toxic wastes, these policies are of critical importance. Moreover, many of these potential implementational problems may be addressed by future rulemakings.

Section 1006(b) of RCRA requires the Agency to integrate "for the purposes of administration and enforcement" RCRA subtitle C with the goals and policies of other portions of RCRA, as well as other statutes administered by EPA. In light of this requirement and the absence of any clear Congressional directive to apply LDR requirements directly to subtitle D facilities, the Agency must ask itself whether the benefits of treating below characteristic levels warrant the serious implementation problems such as those discussed above. This is particularly true where the administrative record contains inadequate data to set levels below the characteristic level for the many waste matrices represented by a single characteristic waste code. However, where the data is adequate, EPA believes it can successfully implement treatment requirements beyond removal of the characteristic, on a case-by-case basis, without significant disruptions to other regulatory programs to further the goals of section 3004(m) by requiring treatment beyond removal of the characteristic. EPA is prepared to reevaluate these issues in future rulemakings based on further information and experience with implementing the LDR program.

The extent to which the treatment goals of section 3004(m) are furthered by

[8] Waste disposed into such units would need to meet the treatment requirements unless disposal is (1) into a "no migration" unit approved under 40 CFR part 148 or 268, or (2) into a surface impoundment which meets the requirements of RCRA section 3005(j)(11).

[9] As noted below, EPA has provided a regulatory structure to enforce dilution rules which does not impact subtitle D facilities.

treatment beyond removal of the specific characteristic and by application of LDR dilution rules is discussed below for certain classes of wastes and certain classes of waste management practices. EPA also will consider section 3004(g) and the Congressional directive under section 1000(b) of RCRA to integrate regulatory programs. Accordingly, EPA's approach is to balance both the extent of additional treatment provided from treatment beyond removal of a characteristic and regulatory integration concerns for LDR standards relating to characteristic wastes.[10]

Below, EPA addresses three separate DR requirements: treatment levels, ethods of treatment, and dilution ohibitions. In addition, EPA discusses xclusions for some of these quirements for certain practices gulated under the CWA and SDWA.

Treatment Levels

a. *Environmental Considerations.* ection 3004(m) states that treatment andards should substantially diminish e toxicity or mobility and minimize ort-term and long-term threats. The gislative history of this provision also ates that regulation under RCRA ould complement and reciprocally re-force regulations under the CWA. S. pt. at 16. EPA's framework for veloping best demonstrated available chnologies helps to ensure that xicity and mobility are minimized. dditionally, the methods or levels rived through the BDAT process also inimize short and long-term threats to man health and the environment. hus, in establishing BDAT, EPA seeks achieve substantial reductions in xicity and mobility, not merely cidental or small reductions. Available ta and objectives of the land disposal restrictions program are both relevant for determining the appropriate level of minimization in individual cases. Treatment to a characteristic level will result in a substantial reduction in the toxicity or mobility of the characteristic waste matrices EPA has evaluated in this rulemaking. For example, EPA's stabilization data for arsenic demonstrated untreated EP toxicity from 41 to 6450 mg/l. Treatment of these wastes to the characteristic level of 5 mg/l results in a reduction of 88 to 99.9%. The Agency also believes that further treatment may, in some cases, continue to minimize threats to human health and the environment. However, for other waste treatability groups addressed in this rulemaking, EPA believes it only has sufficient data, at this time, to establish treatment levels at the characteristic level. See section III A above.

This section sets forth EPA's approach for developing treatment standards for each category of characteristic wastes. The Agency based its decisions on the data available at the time of this rulemaking. See RCRA section 3004(d)(1). EPA plans to re-examine these standards as new information becomes available. In addition, EPA will develop additional standards for the newly-identified wastes in the toxicity characteristic rule.

Today's rule reflects a decision to take limited, but nonetheless significant, steps within the point of generation framework. As a general matter, the Agency believes that the goals of section 3004(m) may require application of standards which go beyond the characteristic level (subject to harmonization with section 3004(g) policies) in some future cases. EPA intends in the rulemaking for TC wastes to evaluate more stringent treatment levels for more treatability groups. This would potentially require lower levels for characteristic constituents and treatment of other hazardous constituents in a given characteristic waste matrix. The phased approach in today's rule is consistent with the principle that an agency is entitled to the highest deference in deciding the sequence and grouping in which it addresses issues. *Hazardous Waste Treatment Council* v. *EPA* , 861 F.2d 277, 287 (D.C. Cir. 1988) (upholding EPA's construction of HSWA statutory provisions in a way that allowed the Agency to take one step at a time in implementing the provisions under HSWA); *Associated Gas Distributors* v. *FERC,* 824 F. 2d 981, 1039 (D.C. Cir. 1987).

(1) *Toxic Wastewaters.* EP toxic inorganic wastewaters are primarily destined for NPDES wastewater treatment systems, pretreatment systems and UIC injection wells. Given current data EPA could set treatment levels about an order of magnitude below the characteristic levels for some of the EP toxic metal wastewaters. Imposing treatment standards below the characteristic level, however, could have the effect of invalidating legitimate methods of treatment involving surface impoundments that are part of CWA wastewater treatment trains (equalization basins used to equalize flows to centralized chemical precipitation and sedimentation treatment, for example). A treatment standard below characteristic levels would need to be met prior to placement in a subtitle D treatment impoundment. This would be so even though the impoundment might treat the waste for purposes of CWA requirements. In effect, this could move BAT/PSES standards from end-of-pipe to in-process, requiring facilities to change their existing wastewater treatment systems or comply with internal waste stream requirements that would overlap with CWA requirements. Imposing such standards on Class I non-hazardous UIC disposal could interfere with protective disposal practices with no corresponding environmental benefit (see discussion on dilution below).

As a result, EPA is not imposing treatment standards below characteristic levels for such wastewaters. Based on the information in the rulemaking record virtually all wastewaters are managed in the context of CWA treatment impoundments or UIC wells.[11]

(2) *Toxic nonwastewaters.* With respect to nonwastewaters exhibiting the EP characteristic for metals, EPA determined that BDAT is based on vitrification of stabilization. These technologies are matrix-dependent types of treatment. When considering characteristic wastes, the amount of diversity within a single waste code is typically extensive. This is because, unlike listed wastes, the characteristics do not identify wastes from single processes, single industries, or single chemical species, but rather can come from virtually any process or industry.

[10] In determining that some balancing of mpeting section 3004(m) and 1006(b)/3004(g) erests is necessary in establishing prohibitions characteristic wastes, the Agency is further termining that the framework outlined in the urt's opinion in *HWTC III,* 886 F. 2d 355 (D.C. Cir. 89) and the Agency's response to that opinion (55 6640 (Feb. 26, 1990)) is not dispositive in the fering context of characteristic wastes. Both the inion and the Agency's response dealt with uations where listed hazardous wastes were ing disposed so there were no competing interests balance against the Section 3004(m) mandate. nsequently, the Agency determined that until it uld develop *de minimis* concentration levels ich establish when threats from prohibited stes are minimized, it would opt for the certainty technology-based treatment standards to remove much of the uncertainty associated with land sposal of hazardous wastes. 55 FR at 6642. aracteristic wastes present a different situation, wever, due to the potential disruption of other ograms, see supra, and possible minimal benefits treatment below the characteristic levels in some ses.

[11] If EPA should receive information in the future indicating that significant volumes of wastewater is land disposed in another context EPA will reevaluate the issue of setting treatment levels lower than the characteristic level for EP toxic metals. Again EPA is utilizing its considerable discretion to address issues one at a time. See *HWTCIII,* supra, 861 F. 2d at 287.

Using available data, it is not possible in this rulemaking, due to lack of time and data on this diverse universe, to subcategorize each characteristic waste into treatability groups designed specifically for certain industries or processes. Thus, in considering what treatment standards are achievable for EP toxic metal nonwastewaters, the Agency had to develop uniform standards based on BDAT technology that constitute all or most of the wastes identified by the characteristic.

As discussed in section IIIA. of the preamble, the Agency is confident that these wastes can be treated at least to characteristic levels. However, the Agency is unable to treatment standards below the characteristic level are achievable for all of such wastes. Certainly, as shown by data submitted by the waste treatment industry and other commenters, some samples in these waste categories can be treated to levels below the characteristic, and some to levels well below (an order of magnitude or more, in some cases). The Agency does not believe that these data are sufficiently representative, however, to warrant extrapolation to all waste matrices under a given waste code.[12] See discussion in section IIIA.

In reviewing the additional data submitted by commenters, the Agency was struck by the amount of diversity often present in the treatment data for a particular characteristic, not only confirming the matrix-dependent nature of the technology, but the difficulty of finding a single numerical standard that would be generally achievable for all wastes in that particular metal waste code. Another problem confirmed by data is that many wastes exhibit characteristics for more than one metal, and optimized treatment for one metal can preclude optimized treatment for another. Yet virtually all of the metal treatability data in this record is for treating only one metal.

Even if the Agency had enough data to require treatment below the characteristic levels for these wastes, it would likely have to establish specific treatability groups within the individual codes (as done today to a limited extent). Many of the difficulties in assessing data noted briefly above, and discussed in detail in the sections on each characteristic metal, appear to be industry or process specific. It should be noted that the Agency expects that treatment will result in levels slightly below the characteristic levels in any case. This is because most treatment technologies cannot easily be "turned off" at precisely the characteristic level and, thus, EPA believes the requirement to treat to the characteristic level will often result in further treatment.

For EP toxic pesticide nonwastewaters, treatment is based on a non-matrix dependent technology that can reduce hazardous constituent levels to orders of magnitude below the characteristic level. Thus, the types of difficulties posed for EP metals—assessing treatment achievability for a wide variety of wastes treated by a matrix-dependent technology—are not presented for pesticide wastes. Moreover, the pesticide wastes are potent carcinogens, so that removing the uncertainties of the threats they pose when land disposed is highly desirable. The Agency, thus, is establishing treatment standards for these wastes based on performance of optimized destruction technology. EPA does not believe the general regulatory difficulties in implementing this requirement to treat below characteristic levels are significant in the context of subtitle D facilities as there is a limited amount of this waste in existence and the destruction of the toxic constituents is a clear benefit over other treatment approaches.

(3) *Other Characteristic wastes.* As discussed in section IIIA., for most corrosive, reactive, and ignitable characteristic wastes, the Agency has determined that the appropriate treatment for these wastes is to remove the characteristic. The environmental concerns from the properties of ignitability, corrosivity, and reactivity are different from the environmental concern from EP toxic wastes. Toxic constituents can pose a cumulative impact on land disposal even where waste is below the characteristic level. Where wastes pose an ascertainable toxicity concern, as with high TOC ignitable wastes, and cyanide-bearing and sulfide-bearing reactive wastes, the Agency has developed treatment standards that address the toxicity concern and (in effect) require treatment below the characteristic level. As discussed in section IIIA., this approach is important to address toxic constituents in this waste. EPA does not believe the regulatory problems in implementing standards for this limited number of streams will be significant. Otherwise, treatment that removes the properties of ignitability, corrosivity, and reactivity, fully addresses the environmental concern from the properties themselves. Further discussion is contained in the preamble dealing with each specific characteristic.

b. *Regulatory Problems.* In reaching the approach set forth in today's rule, EPA has considered the advantages of additional treatment, with the difficulties in (1) implementing a requirement to treat below characteristic levels and (2) the effect of such a rule on overlapping federal environmental programs.

The characteristic level evaluated at the point of disposal serves to distinguish certain disposal practices and facilities from other permitting and regulatory requirements under Subtitle C of RCRA. Many commenters argued that there are significant advantages to providing a clear regulatory boundary which serves, in most cases, to separate the jurisdiction of different environmental programs. As discussed above, LDR provisions that apply to require treatment beyond removal of the characteristic might require complicated tracking and enforcement provisions that would apply at many subtitle D disposal facilities which are currently not subject to any subtitle C requirements. The most complicated of such requirements would involve enforcing levels below the characteristic levels. To enforce and implement such requirements, EPA would potentially need to expand the universe of disposal facilities covered by the LDR provisions to perhaps thousands of facilities.

Requiring levels of treatment below the characteristic level would also have specific disruptive impact on practices regulated, in part, under the CWA. In effect, a treatment standard below characteristic levels would need to be met prior to placement in a surface impoundment used in the treatment process. EPA estimates that up to 2000 nonhazardous treatment impoundments could be affected by a requirement for treatment below characteristic levels. There are other difficulties in applying treatment standards below characteristic levels to injection wells regulated under the SDWA which are described in detail below.

EPA does not believe that the current technical data in the record justifies treatment levels below characteristic levels for the nonwastewater EP toxic metals. Thus, EPA has not engaged in an extensive balancing of regulatory integration problems for the wastes in this rule. For the EP toxic pesticides, EPA believes treatment to the levels provided for in the BDAT incineration technology is important to destroy these particularly dangerous pesticides. Because there is a limited amount of these pesticides, EPA believes the

[12] The treatment industry data, for example, was often deficient in such information as to whether and how concentrated characteristic wastes are mixed and back calculations for dilution effects resulting from pretreatment mixing. See section IIIA.

environmental considerations outweigh any difficulties in implementing the LDR requirement to treat below the characteristic level. For wastewaters, EPA believes the regulatory difficulties in integrating the CWA and SDWA programs outweigh the limited benefit from additional treatment based on the current information. Finally, EPA has set requirements to remove certain toxic constituents from certain ignitable and reactive wastes. Some of these treatment requirements are in the form of methods which are discussed below. Again, EPA believes the environmental benefit in terms of treatment outweights the regulatory problems in providing such standards for these wastes because of the limited circumstances involving such wastes.

4. Methods of treatment

a. *Environmental Considerations.* EPA has express authority to specify methods of treatment as the treatment standard. As discussed above, this necessarily entails a point of generation approach. Imposition of these treatment methods normally results in more than the removal of the characteristic and further minimizes threats to human health and the environment.

EPA proposed methods of treatment for certain classes of characteristic wastes. There are several advantages to specifying a method of treatment. First, EPA may not have enough data to set a level of treatment. In such cases, a method can still fulfill the purposes of 3004(m) by providing for treatment. Second, analytic methods may not exist to measure key constituents in a prohibited waste, in which case designation of a method is the only way to ensure treatment. Third, a method may treat other constituents beyond those addressed by the specific characteristic. Finally, specifying a method may preclude other treatment alternatives which the Agency believes create other risks to the environment. For example, some wastewater treatment systems remove volatile organics from the wastestreams simply by venting these volatiles to the atmosphere. However, there are two disadvantages to specifying methods of treatment: (1) It may preclude the use of alternative methods or development of alternatives that are cost-effective and consistent with Agency objectives; and (2) it establish a national requirement that may not be appropriate for a variety of case-specific applications. For these reasons, EPA must consider carefully a decision to rely on methods of treatment.

In today's rulemaking, EPA is specifying incineration or fuel substitution for ignitable characteristic wastes with high levels of total organic carbon (TOC). The TOC content of these wastes serves as an indicator of high concentrations of hazardous constituents which incineration will destroy. See, e.g., Senator Chaffee's floor statement introducing the amendment that became section 3004(m): "for wastes with a high organic content, incineration should be required in lieu of land disposal." 130 Cong. Rec. S9179 (July 25, 1984).

b. *Regulatory Problems.* To have any practical effect, methods of treatment must generally attach at the point of generation. EPA does not believe, however, that this requirement will be difficult to implement in this rule because a limited number of characteristic wastes are affected. EPA is also somewhat limiting the circumstances under which the methods would apply to avoid certain regulatory integration problems with the SDWA program regulating underground injection wells. However, as discussed below, the requirement to incinerate these wastes is entirely consistent with and promoting of the objectives of the CWA. Accordingly, EPA believes the benefits of incineration of certain categories of characteristic waste outweigh any limited regulatory problems under the CWA.

5. General Dilution Prohibition

a. *Environmental Considerations.* Dilution rules are intended to prohibit dilution in lieu of treatment and to ensure that wastes are treated in appropriate ways. As discussed in the preamble sections on treatment of characteristic wastes, EPA believes the mixing of waste streams to eliminate certain characteristic is appropriate treatment for most wastes which are purely corrosive, or in some cases, reactive or ignitable. As a general matter, these are properties which can effectively be removed by mixing. On the other hand, simple dilution is not effective treatment for toxic constituents. Dilution does not itself remove or treat any toxic constituent from the waste. Accordingly, EPA believes that a dilution prohibition for characteristic wastes is important for purposes of the treatment requirements and carries a significant benefit.

The dilution rules will help minimize hazardous constituents that are currently disposed under both the RCRA subtitle C and D programs. Although few data on specific health and environmental impacts resulting from subtitle D facilities are available, the large volume of waste and number of facilities involved present concerns about actual and potential threats. Based on a 1984 study, EPA estimated that there were 7.6 billion tons of industrial nonhazardous waste disposed in approximately 28,000 industrial solid waste and disposal facilities. More than half of these facilities were surface impoundments, which create concerns because of the mobility and physical driving force of liquids in impoundments and the current limited use of design controls. Study results indicated only sporadic use of design and operating controls at industrial solid waste landfills and surface impoundments, with only 12 percent and 22 percent, respectively, employing any type of liner system. (53 FR 33320, August 30, 1988). Study findings also reveal that few of these facilities have monitoring systems, and only 35 percent were inspected by States in 1984, the latest year for which data are available. The present inspection status is unknown. Limited data on violations of State requirements, coupled with these statistics on design and operating controls, suggest that releases may be occurring (53 FR 33320, August 30, 1988). As discussed below, EPA believes this is an area where the environmental benefits imposing a prohibition on characteristic wastes at the point of generation outweigh the problems in integrating other regulatory programs.

b. *Regulatory Problems.* As discussed below, the LDS dilution prohibition could have a significant disruptive effect on practices regulated, in part, by programs under the CWA and SDWA. EPA generally agrees with the many comments regarding impacts on these programs. In harmonizing or reconciling the general need for a dilution prohibition with the need to avoid these disruptive impacts, EPA believes it is appropriate to exempt certain practices from the dilution prohibition. These practices and the rationale for the exemptions are described in the sections that follow.

EPA does not believe these same regulatory problems apply to the program for disposal of other waste under subtitle D of RCRA. Subtitle D establishes a framework for Federal, State, and local government cooperation in controlling the management of nonhazardous solid waste. The Federal role in this arrangement is to establish the overall regulatory direction, to provide minimum standards for protecting human health and the environment, and to provide technical assistance to States for planning and developing environmentally sound waste management practices. The actual planning and direct implementation of

solid waste programs under subtitle D, however, remain State and local functions. Most States impose some set of overall facility performance standards; however, among the States, specific design and operating standards vary greatly.

Under the authority of sections 1008(a)(3) and 4004(a) of RCRA, EPA promulgated the "Criteria for Classification of Solid Waste Disposal Facilities and Practices" (40 CFR part 257), and subsequently issued minor modifications to these Criteria. These Subtitle D Criteria establish minimum national performance standards necessary to ensure that "no reasonable probability of adverse effects on health or the environment" will result from solid waste disposal facilities or practices. The existing Part 257 Criteria include general environmental performance standards addressing eight major topics: floodplains, endangered species, surface water, ground water, land application, disease, air, and safety. Currently, EPA does not have the authority to enforce these criteria directly.

EPA does not believe this regulatory framework is at all similar to those under the CWA and SDWA which, as discussed below, the Agency is excluding from the LDR dilution rules. Specifically, there are limited federal regulatory, implementation or enforcement provisions that would require integration. (This is not the case, incidentially if treatment standards are established below characteristic levels.) In that case, the subtitle D facility would necessarily be involved in the implementation and enforcement of the prohibitions. Accordingly, EPA is codifying the general dilution prohibition for characteristic wastes with certain exceptions.

6. Exemption to Dilution Prohibition for Characteristic Wastes Treated for Purposes of Certain CWA Programs

a. *Introduction.* For listed wastes, there are generally no overlapping CWA and RCRA treatment requirements for wastewater ultimately discharged to a water of the United States or POTW.[13] (Of course, sludges or other residues from NPDES treatment trains which are subsequently land disposed are subject to the land disposal restriction provisions.) Some of these facilities, however, generate waste which exhibits a hazardous characteristic but after mixing with other waste streams ceases to exhibit that characteristic prior to placement in a subtitle D surface impoundment which is part of the wastewater treatment train. These surface impoundments are land disposal units for purposes of LDR prohibitions. The practice of mixing could thus trigger LDR dilution rules. EPA received many comments that the proposed RCRA dilution prohibition for wastewater going into these impoundments could undermine the ability of these operators to use nonhazardous waste surface impoundments as part of their NPDES treatment train.[14] This impact would occur despite the fact that further treatment would occur in the impoundment to remove constituents from the wastewater prior to discharge to waters of the United States or to a POTW. These commenters further argued that application of such RCRA rules to wastewaters already required to be treated under CWA requirements would be unduly confusing and duplicative.

b. *Environmental Considerations.* As discussed below, the NPDES program has a series of technology-based requirements for the treatment of wastewater prior to discharge to waters of the United States. See 33 U.S.C. 1314 and 40 CFR Parts 400–471. These requirements provide for treatment of wastewaters prior to discharge. Indeed, many of the LDR treatment standards are based on data used to set the CWA standards. Thus, EPA believes the overlap of an LDR dilution prohibition where an NPDES treatment train includes a nonhazardous treatment impoundment would not substantially further the treatment goals of the land disposal restrictions.

c. *Regulatory Problems.* The regulatory overlap of similar but not identical dilution rules would create significant regulatory disruption. Section 1006(b) of RCRA provides EPA the authority to consider these integration problems and set requirements that are consistent with the goals and policies of the CWA and RCRA. Many of the effluent limitations guidelines and standards, including all of those reflecting mass-based limits and standards, have factored in controls on dilution. In addition, NPDES permit writers can set requirements which reflect the nature of the treatment process, including best management practices, mass limitations in lieu of concentration based limitations, adjustments to reflect pollutants in intake water, and conditions on internal waste streams. 40 CFR 122.44(k); 122.45 (f), (g) and (h). Indirect dischargers are also subject to specific CWA dilution rules in both the general pretreatment rules and the Combined Wastestream Formula (as well as though many the categorical standards). 40 CFR 403.6 (d) and (e).

In this case, the general treatment requirements and associated dilution rules under the CWA are generally consistent with the similar requirements under RCRA. Relying on the existing CWA provisions is, thus, consistent with the goals of both Acts and avoids unnecessary duplication and potentially conflicting requirements.

EPA also believes, however, that where the Agency has established a method of treatment, and where application of that method is consistent with and promotes the objectives of the CWA program, then the dilution prohibition should apply to make it impermissible to dilute these wastes to avoid treating them by the designated treatment method. This group includes the ignitable nonwastewaters containing greater than 10% total organic carbon (TOC). The treatment methods for these wastes is incineration or, in the case of the ignitable waste, fuel substitution. Prohibiting dilution to require the specified method is entirely consistent with the regulatory framework for the CWA programs. The high TOC ignitable wastes, in particular, are inappropriate for wastewater treatment systems as the high TOC levels would overwhelm the capacity for most biological treatment systems. In addition, EPA believes there are few remaining pesticide wastes designated as D012–17. Thus, this requirement should have minimum impact on CWA systems. Accordingly, the exemption from the dilution prohibition for CWA systems is not an exemption for the requirement to follow specific methods of treatment.

[13] Wastewater which contains a listed hazardous waste and is ultimately discharged to waters of the United States under an NPDES permit pursuant to section 402 of the CWA or to a Publicly Owned Treatment Works (POTW) pursuant to section 307 of the CWA is not ordinarily subject to the land disposal prohibitions for several reasons. First, in many situations, the wastewater is managed in tanks prior to discharge and, thus, there is no placement in a land disposal unit. Second, even where a surface impoundment is used to treat hazardous waste prior to discharge such surface impoundments may satisfy the requirements of section 3005(j)(11) of RCRA in lieu of meeting section 3004(m) treatment standards. See § 268.4. Section 3005(j)(11) requires an impoundment to meet certain design requirements set out in section 3004(o)(1) of RCRA and be dredged annually to remove residues.

[14] As noted above, applying LDR requirements at a point of generation would require a facility either to (1) treat the waste prior to placement in the surface impoundment (2) obtain a "no migration variance, (3) comply with section 3005(j)(11); or (4) install tank treatment instead of using surface impoundments.

7. Exemption from LDR Prohibitions for Characteristic Wastes Disposed Below Characteristic Levels in Wells Regulated under the SDWA

a. *Introduction.* EPA has set out a regulatory program under sections 1421, 1422, and 1425 of the SDWA which contains "minimum requirements for effective programs to prevent underground injection which endangers drinking water sources." 42 U.S.C. 300h(b)(1). Class I deep wells inject below the lowermost geologic formation containing an underground source of drinking water (USDW). 40 CFR 144.6(a).[15] These wells are subject to location, construction, and operating requirements set out at 40 CFR parts 144 and 146. In addition, EPA may authorize States to administer the UIC program. 40 CFR parts 145 and 147. There are approximately 400 such wells currently injecting only nonhazardous waste.

The large facilities that have these wells often mix waste streams and through this mixing remove the characteristic prior to disposal. A dilution prohibition would require restructuring of these facilities. Alternatively, the facilities could apply for a "no migration" variance under 40 CFR part 148.

b. *Environmental Considerations.* LDR dilution rules for wastes currently disposed of below the characteristic levels in UIC wells would be limited to toxic wastes. As discussed below, EPA is generally providing that treatment of ignitable, corrosive or reactive wastewater may be accomplished simply by removing the characteristic. This could be accomplished by mixing. There are a few exceptions discussed in the specific discussion on treatment standards.) These general standards are based on EPA's technical evaluation of appropriate treatment for purposes of 3004(m) regardless of the disposal scenario. Thus, for these particular characteristic wastes, the application of the part 268 dilution prohibition to operators of nonhazardous waste injection wells would not require any additional treatment beyond what is already occurring. Moreover, there is a very limited amount of the pesticide wastes D012–17, and EPA is unaware of deepwell injection practices for these wastes. Thus, the characteristic wastes of concern for UIC wells in this rule are those that exhibit the characteristic of EP toxicity for metals at the point of generation.

[15] A USDW is defined to include aquifers containing waters with up to 10,000 milligrams per liter ("mg/l") of total dissolved solids ("TDS"). 40 CFR 144.3.

EPA believes that the application of dilution rules to these wastes would not further minimize threats to human health and the environment. Specifically, EPA believes that disposal of these metals by underground injection at the characteristic level is as sound as the treatment option. Native formation fluids in injection zones already contain substantial concentrations of these metals. The addition of more metal-bearing fluid below characteristic levels would not appreciably alter these concentrations. Moreover, the propensity of such metals to adhere to and, thereby, generally stay contained in the injection zones makes the practice of deep well disposal of such constituents an environmentally sound one. The example of immobilizing heavy metals in a unit is also noted in the legislative history.[16] In addition, as discussed below, there is a significant body of information that EPA has received from the petition process under 40 CFR part 148 concerning the containment properties of injection zones for dilute levels of the wider range of toxic constituents. This data supports the containment properties of these injection zones.

c. Regulatory Problems. There would be significant regulatory problems from application of a dilution prohibition to this category of facilities. If such a prohibition were to apply, many well operators would seek a "no migration" variance for their wells. EPA considers such wells likely candidates to be granted variances. Currently, however, EPA is processing variances for hazardous waste injection wells and is not processing variances for nonhazardous wells.

Hazardous waste injection is specifically subject to RCRA's land disposal restrictions. RCRA section 3004 (f), (g) and (k). Approximately 65 of these facilities have submitted petitions to obtain "no migration" variances from the LDR treatment requirements as provided for in 40 CFR part 148. EPA has proposed to grant 15 such variances, has granted 12, and anticipates that many other petitions will be both proposed and granted for underground injection. Thus, as a general matter, EPA believes the practice of deep well injection can be a protective practice within the framework of the land disposal restrictions rule. The petition process, however, has been very time consuming and resource intensive. In addition, the process has involved a high degree of coordination with states that are authorized to administer the UIC permit program.

EPA experience with the "no migration" petition process indicates that many nonhazardous deep wells could probably qualify for a "no migration" variance under 40 CFR part 148. However, operators of nonhazardous waste wells have not had reason to believe that their operations would be subject to the land disposal restrictions and have not submitted variance petitions. Moreover, EPA is not convinced that the Part 148 regulations would be appropriate for nonhazardous waste wells. The goal of the SDWA regulations for deep well injection is containment of the wastes in an injection zone. This goal is consistent with the protectiveness goals behind the "no migration" variance under RCRA. There are no documented problems with the effectiveness of the UIC regulations.

Moreover, even where the practice involved disposal of hazardous waste, Congress fashioned statutory provisions in RCRA which reflect the view that there is more certainty concerning the safety of the deep well disposal practice than surface disposal practices. For example, RCRA sections 3004(c) and 3019(b) ban both landfilling of liquid hazardous waste and underground injection of hazardous waste into or above USDWs. RCRA provisions regarding deep well injection of hazardous waste, however, provided for further EPA review of this method of land disposal and allow for variances from the statutory prohibition. RCRA section 3004 (f) and (g). The legislative history of the 1984 Amendments also state that "underground injection of hazardous waste can be safe environmental technology," Statement of Senator Bentsen, 129 Cong. Rec. S9153 (daily ed. July 25, 1983), and envisioned that compliance with the then-existing underground injection control regulations could be sufficient to justify continued operation. *Id.* Through the Part 148 petitions, EPA has gained further knowledge concerning the critical issues determining the safety of the practice. In general, where the SDWA regulations are followed, injection of dilute amounts of toxic constituents is safe. Where injection is of waste below the characteristic level the injection zone will appropriately contain these hazardous constituents in a properly operating injection well.

Accordingly, if EPA were to apply a dilution prohibition to nonhazardous wells at this time, there would be

[16] "Another example of a potentially acceptable land treatment situation involves wastes containing heavy metals. Although land treatment does not render the waste nonhazardous, a prohibition would not be necessary if there is long-term certainty that the hazardous constituents would be immobilized" H. Rep. No. 198 at 34.

considerable disruption at facilities that EPA generally considers safe. On balance, EPA believes it is appropriate to exempt from the LDR prohibitions characteristic waste disposed below the characteristic level in these wells.

E. Implementation of Requirements for Characteristic Wastes

In today's final rule, the Agency is promulgating several new provisions concerning implementation of the land disposal restrictions for characteristic wastes. Specifically, the Agency is amending 40 CFR 268.7 and adding 40 CFR 268.9 to incorporate recordkeeping requirements and special rules for characteristic wastes, and is revising the current regulations in parts 261 and 262 regarding the identification and management of wastes that exhibit a characteristic. In addition, the Agency is clarifying which requirements apply during the period of a national capacity variance both to wastes that are prohibited on the basis of exhibiting a characteristic only, and to wastes that have applicable treatment standards as both listed and characteristic wastes. Finally, the Agency is clarifying whether to apply the TCLP or EP analytical methods to verify compliance with the treatment standards.

1. Overlap of Treatment Standards for Listed Wastes that also Exhibit a Characteristic

The Agency is today promulgating its proposed approach with respect to determining applicable treatment standards for wastes that carry more than one waste code.

(1) For wastes that carry more than one characteristic waste code, the waste must be treated to meet the treatment standard for each characteristic.

(2) If a listed waste also exhibits one or more hazardous characteristics, the waste must be treated to meet the treatment standard for each of the waste codes with one exception. Under that exception, if the relevant constituents or narrative characteristics are specifically addressed in the treatment standard for the listed waste, then the standard for the listed waste operates in lieu of the standard for the relevant characteristic(s).

One commenter suggested that EPA should require treatment in compliance with the most stringent treatment standard rather than the most waste-specific treatment standard. The Agency disagrees, and EPA is following the general principle set out in previous rulemakings that the more specific treatment standard takes precedence. This is the principle EPA adopted with respect to California list wastes that are covered by another treatment standard, an analogous situation. See 52 FR 25773 and 25776 (July 8, 1987). At the same time, when a listed waste exhibits a characteristic that is not addressed by the listed waste's treatment standard, EPA believes it is necessary for that characteristic to be treated to meet the characteristic treatment standard.

The Agency received several comments indicating that subjecting listed wastes to treatment standards for characteristics is a major shift in the current regulatory program. As stated in the proposed rule, the Agency believes that to ignore the characteristic would mean that the Third Third prohibition for that characteristic is being ignored, and that with respect to that constituent, the waste's toxicity or mobility is either not being reduced or not being minimized. Since this outcome would satisfy neither the statutory language nor its policy, EPA is requiring treatment. As with the California list wastes, EPA is applying this principle at the point of generation, since otherwise the treatment standard for the characteristic constituent could be ignored by removing the characteristic. EPA is consequently promulgating new requirements in § 268.9 (b) and (c) as proposed.

EPA is further promulgating provisions specifying that disposal of a waste which at the point of disposal exhibits a characteristic is prohibited unless the treatment standard for that characteristic component is above the characteristic level. This approach is again essentially the same as that which EPA adopted for the analogous situation involving California list wastes (see 52 FR 25767), and is needed to ensure that the statutory prohibition against disposal of characteristic hazardous wastes is not violated.

2. Revisions to Waste Identification Requirements

A consequence of the Agency's interpretation that the prohibition for characteristic wastes can apply concurrently to wastes that also are listed is a change in the initial determination that a generator must make pursuant to § 262.11. That section presently sets out an either/or scheme where if the generator determines that a waste is listed, the generator does not need to determine whether the waste exhibits a characteristic (40 CFR 262.11 (b) and (c)). For purposes of compliance with part 268, however, the generator would need to know if the waste exhibits a characteristic, even if the waste is listed, because further treatment of the waste is required if the treatment standard for the listed waste does not address the characteristic property. Consequently, EPA is amending section 262.11 to indicate that generators must determine whether listed wastes also exhibit characteristics of hazardous waste for purposes of compliance with part 268.

In addition, §§ 261.21—261.24 indicate that wastes that exhibit the respective characteristics and are not listed have the designations D001–D017. However, as discussed above, generators (and other handlers) will need to know both the listed waste code and the characteristic waste code in the event a listed waste also exhibits a characteristic which is not addressed by the treatment standard for the listed waste. EPA is consequently amending the language in these sections to indicate that wastes that carry characteristic waste codes may also be listed wastes.

3. Wastes Subject to a Capacity Variance

RCRA section 3004(h)(4) states that during periods of national capacity variances and case-by-case extensions, hazardous wastes subject to those extensions that are disposed in landfills and surface impoundments may only be disposed of if the landfill or surface impoundment is in compliance with the minimum technological requirements of section 3004(o). EPA has interpreted this language to mean that the landfill or impoundment unit receiving such wastes must be in compliance with the minimum technological requirements, § 268.5(h)(2), and this interpretation was sustained in Mobil Oil v. EPA, 871 F. 2d 149 (D.C. Cir. 1989).

Under the present rule, it is possible for prohibited characteristic wastes subject to a national capacity variance to become nonhazardous. For example, certain D009 mercury wastes are subject to a two-year national capacity variance. If, during the period of the variance, such a waste was treated to be nonhazardous by a means other than retorting and was disposed of in a landfill or surface impoundment, arguably the landfill or impoundment unit would have to meet the minimum technological requirements.

EPA does not read the statute or the rules this way. Rather, section 3004(h)(4) only requires compliance "with the requirements of subsection (o)." Section 3004(o), in turn, only applies to units subject to Subtitle C. See also § 268.5(h)(2), which likewise imposes minimum technological requirements only on landfill and impoundment units that are permitted or that have interim status. Consequently, EPA does not

interpret these provisions as requiring subtitle D landfill and surface impoundment units receiving prohibited wastes during a national capacity variance to have to satisfy the minimum technological requirements.

Finally, for wastes that are subject to more than one treatment standard, the Agency is clarifying that during the period of a national capacity variance for one of the wastes, the treatment standards for any other waste codes that have not received such a variance must be met. For example, if a K048 nonwastewater also exhibits the characteristic for chromium, the waste has a six-month capacity extension as a K048 listed waste, but no capacity extension as a D007 characteristic waste. Therefore, at a minimum, the waste must be treated to meet the treatment standard for D007 (and any other applicable characteristic treatment standard) prior to land disposal. This requirement is consistent with the Agency's approach in previous rulemakings in which it stated that in setting the treatment standard, the Agency is making a more waste-specific determination; however, this determination is not effective until the capacity variance ends. Because capacity exists to treat the characteristic waste, the characteristic treatment standards still apply, and the K048 waste must meet the prohibitions for characteristic wastes. The K048 treatment standard would then become applicable when the national capacity variance expires. See 53 FR 31188. Furthermore, if such listed/ characteristic wastes have been treated so that they no longer exhibit any characteristic and are to be disposed of in a surface impoundment or landfill, the unit must meet the minimum technology requirements set out in section 3004(o), as required for listed wastes during the period of a national capacity variance.

Use of TCLP v. EP Analytical Methods for Compliance

The Agency proposed two alternatives in the proposed rule, that treatment standards for characteristic wastes either be a numerical standard (typically lower then the characteristic level) or be established at "the characteristic level." See, e.g., 54 FR 48430/3. If the latter alternative were adopted, the Agency did not specify whether the characteristic level would be measured by the EP test or by the TCLP. The Agency did indicate in a somewhat different context, however, that it strongly prefers to use the TCLP to measure compliance wherever possible Id. at 48432/3.

As stated in section III.D of today's preamble, EPA is establishing treatment standards for most characteristic wastes at the characteristic level. The Agency has determined that this level should be measured by the TCLP. This is the protocol that large quantity generators will use to assess the toxicity of their wastes starting on September 25, 1990 and small quantity generators will begin using on March 29, 1991. It is also the protocol used to measure the efficacy of stabilization or other immobilization treatment in most of the BDAT standards. Most of the data submitted in response to the Agency's proposal were based on the TCLP to measure treatment performance, and these data indicate (with a few exceptions) that treatment to the characteristic level, as measured by the TCLP, is achievable. (These data, incidentally, were available for reply comments, and the Agency received dozens of reply comments on the data.)

Furthermore, if EPA were to establish the EP as the protocol to measure compliance with metal standards, then regulated entities would have to subject many wastes to both the EP (for purposes of land disposal restriction compliance) and the TCLP (for waste identification purposes). The Agency prefers not to impose this type of duplicative burden. Accordingly, the Agency is adopting the TCLP as the means of measuring compliance with the metal standards for toxic characteristic Third Third wastes in this rule, with two exceptions. For lead characteristic nonwastewaters and all nonwastewaters containing arsenic as the primary hazardous constituent (*i.e.*, D004, K031, K084, K101, K102, P010, P011, P012, P036, P038, and U136), the Agency is specifying that if a waste does not achieve the nonwastewater standard based on analysis of a TCLP extract but does achieve the standard based on analysis of an EP extract, the waste is in compliance with the standard. The Agency is taking this action because the performance data used to develop the treatment standards for these wastes were based on EP toxicity leachate data. A more detailed discussion is provided in section III.A of today's preamble.

5. Newly Identified TC Wastes

There is one final interpretive point dealing with the interplay of the EP and the new TCLP. EPA interprets the statute such that wastes that exhibit the toxicity characteristic by the TCLP but not the EP are not presently prohibited, even if the constituent causing the waste to exhibit the TCLP is also a constituent controlled by the EP. This is because such wastes are newly identified pursuant to RCRA section 3004(g)(4); they were identified as hazardous after November 7, 1984.

6. Further Principles Governing Applicability

a. *Other Statutory Exemptions or Exclusions.* The issues in this rulemaking concerning when hazardous wastes become prohibited from land disposal does not change the status of other regulatory or statutory inclusions or exclusions to the definition of solid or hazardous waste found at 40 CFR 261.2–.6. These provisions can override the LDR point of generation evaluation to keep wastes from being prohibited and subject to a dilution prohibition or treatment standard. This result is consistent with EPA's existing regulation at 40 CFR 268.1.

EPA believes that different legal and policy considerations under exclusions from the statutory and regulatory definitions of solid waste and hazardous waste require an evaluation of the status of the waste at the point of disposal. Generally, these exclusions address the status of the waste without regard to a particular constituent concentration, and thus do not involve issues of treatment levels or dilution. EPA has not fully analyzed these exclusions and, in the absence of specific justification, will continue to provide exclusions from the land disposal restrictions for waste excluded from the definition of hazardous or solid waste under 40 CFR 261.2–.6.

For example, solid waste does not include solid or dissolved material in domestic sewage. RCRA section 1004(27). EPA regulations further provide that any mixture of domestic sewage and other waste that passes through a sewer system to a Publicly Owned Treatment Works (POTW) for treatment is not solid waste. 40 CFR 261.4(a)(1). Thus, even if a waste is hazardous at the point of generation, the domestic sewage exclusion would allow land disposal of the solid waste at the POTW without meeting treatment standards under section 3004(m) (assuming that there is no land disposal of the waste before it becomes subject to the domestic sewage exclusion).

b. *Restricted Wastes Versus Prohibited Wastes.* Consistent with the cradle-to-grave mandate of RCRA's land disposal restrictions, those who manage hazardous waste will need to assess what LDR prohibitions apply at different points in the waste management process. First, generators of restricted wastes must assess whether the waste is prohibited under the LDR. Restricted waste is defined by several conditions.

See 51 FR at 40619—40632 (November 7, 1986); 54 FR 36967, 36968 (Sept. 6, 1989).

As discussed above, however, certain statutory exemptions that would be evaluated at the point of land disposal may apply to restricted wastes. Moreover, during either a national capacity variance under section 3004(h)(2) or a case-by-case variance under section 3004(h)(3), disposal of certain restricted wastes into certain units would not be prohibited. Also, placement of waste in a "no migration" unit is not prohibited land disposal, nor is placement in an impoundment in compliance with 40 CFR 268.4. In addition, there are situations where waste in managed in a way which results in no land disposal. EPA outlined which LDR prohibitions attach to wastes managed under each one of the above scenarios in 54 FR 36967, 36968 (September 6, 1989).

c. *Changes in Treatability Groups.* The question of whether a given waste is going to prohibited land disposal is complicated by the fact that wastes may change form or treatability groups after undergoing treatment. For example, treatment of a wastewater often generates a nonwastewater sludge as well as a treated wastewater. Also, incineration of a nonwastewater can generate a nonwastewater (ash) as well as a wastewater (scrubber water). (A treatability group is defined both in terms of the applicable waste code and the form the waste is in.) The specific problem addressed here, which occurs most often with respect to characteristic wastes, is the effect that changes in treatability groups have on the initial status of a waste as prohibited or non-prohibited.

First, by way of background, the part 148 and 268 regulations generally divide the universe of wastes potentially subject to land disposal prohibitions into two broad categories: wastewaters and nonwastewaters. For purposes of the LDR program, "wastewaters" are generally defined to have less than 1% total organic carbon (TOC) and less than 1% total suspended solids. Any other waste stream is deemed a nonwastewater. (There are certain enumerated exceptions from certain wastes such as F001–F005 solvents, and K011, K013, and K014 acrylonitrile wastes. See generally § 268.2 in today's rule, incorporating the various regulatory definitions.) Part 268 provides for different treatment standards for these two broad categories of waste. The standards may also have different effective dates because of national capacity variances. Treatment standards for listed wastes apply to the waste as generated as well as to all of the residual wastes that are generated in treating the original prohibited waste. *See* 53 FR 31138, 31145 (August 17, 1988). However, 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 specify other requirements). 54 FR 26594, 26624, 26630 (June 23, 1989).[17]

A change in treatability group during the waste management process can affect whether the waste prior to the change in treatability groups is subject to certain LDR requirements. The following rules are important to understand this point. First, if a treatability group, and treatment residues in the same treatability group, is not going to prohibited land disposal, then neither the original waste nor the residue is subject to the treatment standards or to the dilution prohibition. As a corollary, waste *is* prohibited if the treatability group, or residues from the same treatability group is land disposed. This interpretation provides a clear line of demarcation, avoids the enormous difficulties of determining new points of generation every time a hazardous waste is altered in some respect, and avoids having an initial waste's status as prohibited determined in all cases by some later management of a residue derived from the initial waste.

d. *Examples.* Several examples will be useful to help clarify this point.

Example 1. Listed wastewater A is treated in a tank that yields two residue streams: nonwastewater residue B and wastewater residue C. The nonwastewater residue is land disposed and the wastewater residue is discharged pursuant to an NPDES permit without being land disposed.

Only nonwastewater residue B is going to prohibited land disposal. Moreover, residue B is a newly generated hazardous waste belonging to a different treatability group than the original waste. *See* 53 FR 31209; 52 FR 25667 col. 1 (July 8, 1987). The original hazardous wastewater A is a restricted waste, but not prohibited, and so is not subject to the dilution prohibition in 40 CFR 268.3 or any treatment standard under part 268. Wastewater residue C also is a restricted waste (due to the "derived from rule" it carries the same hazardous waste code under 40 CFR part 261 as the original waste A), but it is not a prohibited waste because the wastewater treatability group is not going to prohibited land disposal.

Example 2. Listed nonwastewater D is treated to yield two nonwastewater residues E and F (which carry the same waste code as D based on the derived from rule). Residue E is incinerated and the ash is land disposed; residue F is directly reused as a substitute for a commercial chemical product. In this case, nonwastewaters D and E are subject to treatment standards and the dilution prohibition. EPA does not want impermissible dilution of nonwastewater D to be the reason that the nonwastewater residue E meets the BDAT level. Thus, since there is no change in treatability group between the original point of generation and land disposal for one residue of the original waste D the part 268 prohibitions apply. However, residue F is not a prohibited waste because the definition of solid waste excludes secondary materials that are directly reused as substitutes for commercial chemical products.

As illustrated by the above examples, a unit treatment operation can be a point of generation for certain treatability groups. To assess what prohibitions apply, one must first determine whether any residues of the listed waste go to prohibited land disposal. If no residues are land disposed then part 268 treatment requirements do not apply. If one or more residues are placed in prohibited land disposal, the dilution prohibition applies between the point of land disposal and the point that a given treatability group first exists. In example 1, that point is immediately after the tank treatment operation. In example 2, that point is the original point of generation for nonwastewater D.

The rules regarding treatability groups apply similarly to characteristic wastes. The fact that a waste loses its hazardous characteristic at some point prior to land disposal does not constitute a change in treatability group. The fact that the derived from rule does not apply to characteristic wastes is irrelevant because the derived from rule only affects hazardous waste status, not treatability group determination (which is a function of physical form). To determine if a characteristic waste is prohibited, the decision is still made based on whether the waste or any residue in the same treatability group is destined for land disposal. This approach is necessary to assure that this

[17] A facility is not allowed to dilute or perform partial treatment on a waste in order to switch the applicability of a nonwastewater standard to a wastewater standard or vice versa. *See* 52 FR 21012 (June 4, 1987); but see 52 FR 25767 (June 8, 1987) noting special circumstances when California list wastes are involved. Dewatering technologies (such as filtration and centrifugation) that are designed to separate wastewater from nonwastewater are not prohibited.

level was met by treatment and not by dilution. The following example helps illustrate this decision rule.

Example 3. Wastewater J is EP toxic for lead. It is treated in a tank and generates a sludge K, that is non-hazardous. The treated wastewater L, which no longer exhibits a characteristic, is then sent to a surface impoundment for further treatment, after which it is discharged under an NPDES permit. The sludge is sent to a landfill.

The sludge K is not a restricted hazardous waste, notwithstanding that it derives from treatment of a characteristic hazardous waste. This is because it is a new treatability group which is not hazardous at point of generation. The status of wastewaters J and L is determined by the special rules for characteristic wastes managed in CWA systems; therefore, they are prohibited wastes but are not subject to the dilution prohibition. Since wastewater L meets the treatment standard when it is land disposed, the disposal is legal.

Example 4. Electroplating wastewater M which exhibits a hazardous characteristic, is treated in a tank to yield a treated wastewater N and a nonwastewater sludge O. The treated wastewater N, which no longer exhibits a hazardous characteristic, is discharged into a Class I injection well and the sludge is sent to a landfill.

In this example, neither wastewater M nor N is a prohibited waste due to the special rules for wastes managed in Class I injection wells subject to the SDWA. Sludge O is a newly generated waste that meets the listing description for EPA Hazardous Waste No. F006. Sludge O is a prohibited waste because this nonwastewater is destined for placement in a land disposal unit.

Example 5. An EP toxic wastewater sludge P is dewatered to yield a nonwastewater sludge Q which is EP toxic and now exceeds the California list level for lead. Also, a wastewater R is generated which exhibits a hazardous characteristic. The sludge Q is sent to a landfill and the wastewater R is mixed with domestic sewage and sent through a sewer system to a POTW.

Both sludges P and Q are prohibited wastes because Q is sent to land disposal and P is in the same treatability group as Q. Note that during a (hypothetical) national capacity variance for the lead characteristic treatment standard, Q must comply with the California list standard for lead. Wastewater R is a restricted waste, but not a prohibited waste because it is covered by a § 261.4 exclusion from the definition of solid waste.

In conclusion, it should be noted that the previous discussion applies in determining when prohibitions attach. The issue of what administrative requirements apply by virtue of a waste being restricted is discussed elsewhere in this preamble.

F. Amended Tracking System for Characteristic Prohibited Wastes

EPA's decisions concerning characteristic wastes necessitate certain modifications of the tracking provisions contained in § 268.7. See 54 FR 48491 and 48492 (requesting comment on this point). This section of the preamble outlines the modifications the Agency is making to the existing rules; and clarifies certain points regarding the rules' applicability to listed wastes as well as to characteristic wastes. The Agency is also amending one of the certification provisions that presently fails to mention compliance with the prohibition on impermissible dilution.

A. Applicability of Tracking Requirements

1. Clarification of and Changes to Generally Applicable Recordkeeping Requirements. Section 268.7 applies to generators, treaters, storers, and disposers of restricted wastes. Most of the provisions contemplate that restricted wastes are being shipped off-site for treatment or disposal (see § 268.7 (a)(2) and (a)(3), and § 268.7 (b)(4) and (b)(5)). The first point the Agency wishes to address is the existing requirements that apply when restricted wastes are managed on-site. At a minimum, certain recordkeeping requirements are triggered. Section 268.7(a) states that generators must first determine whether their waste is restricted. Section 268.7(a)(6) indicates that generators must retain a copy of all demonstrations and other waste analysis or documentation for all wastes sent to either on-site or off-site treatment, storage, or disposal. The Agency interprets these two provisions to mean that ordinarily generators managing hazardous wastes on-site must determine if the waste is restricted, and keep some documentation of that determination plus some documentation of where the restricted waste was treated, stored or disposed—whether treatment, storage, or disposal occurs on-site or off-site. These recordkeeping requirements for on-site management are needed to implement the various prohibitions or to account for those restricted wastes that for some reason are not also prohibited. The Agency notes briefly that certain wastes are not subject to recordkeeping requirements at all by virtue of the exemptions from all of part 268 that are contained in sections 268.1 (b) and (e). (See 54 FR 38968 (September 6, 1989) discussing what a "restricted" waste is.)

The Agency is applying the existing § 268.7 (a) and (a)(6) requirements to characteristic wastes that are restricted under today's final rule. These requirements apply even when the hazardous characteristic is removed prior to disposal, or when the waste is excluded from the definition of hazardous or solid waste under § 261.2–.6 *subsequent to the point of generation.* For example, if a characteristic waste is not prohibited because it is discharged pursuant to a NPDES permit without land disposal, some record must still be kept indicating why the waste is not prohibited. (For example, a statement that there is no land disposal in the system prior to the § 261.4 exclusion should be kept in the facility's operating record.) The rationale for this is that the § 261.4(a)(1) exclusion for domestic sewage does not attach until the mixture passes through the sewer system to a POTW; in the interim, the waste is restricted. (See also section III.E.6 of today's final rule.) Finally, this information should already exist in any case, to justify the absence of subtitle C regulation.

B. Tracking (i.e. Notification/Certification) Provisions Applicable to Generators Shipping Wastes Off-Site

Under existing § 268.7(a), generators managing restricted wastes must determine whether the wastes meet applicable treatment standards on the point of generation, or are otherwise exempt from those standards. Separate tracking provisions apply to each of these situations. Section 268.7(a) (1), (2), and (3). In all cases, however, the generator must prepare a notice for each off-site shipment setting out the hazardous waste identification number, applicable treatment standard or prohibition level, manifest number, and available waste analysis data. If a generator's waste meets the treatment standard, the generator must prepare a certification to this effect. (EPA is thus using the terms "tracking document" and "notification and certification" synonymously in the discussion that follows.)

If a generator's characteristic waste has been treated to meet the treatment standard before it is sent off-site, EPA believes that the existing tracking scheme requires some modification. There are two principal reasons to make changes. Characteristic wastes that meet treatment standards will be sent (almost invariably) to subtitle D facilities. EPA is concerned that sending part 268 notifications and certifications

to subtitle D facilities could be counterproductive. These facilities are not familiar with subtitle C paperwork and could easily mistake the tracking forms (i.e. the notifications and certifications) for manifests and refuse to accept the shipment. Even if the forms are not mistaken for manifests, the subtitle D facilities could view the forms as describing hazardous wastes and refuse to accept the wastes. This could result in a situation where scarce subtitle C management capacity is used for non-hazardous wastes because subtitle D facilities are refusing the non-hazardous wastes.

These potential misunderstandings are probably solvable as subtitle D operators become more sophisticated and as EPA further implements its land disposal restriction training and guidance efforts. The Agnecy believes further, however, that under today's rule no important interest would be furthered by requiring notifications and certifications to be sent to subtitle D facilities. When listed wastes are involved, the tracking document tells disposal facilities what standard the waste must meet before it can be land disposed. Treatment standards for most characteristic wastes are established at characteristic levels, however. Thus, these wastes can be land disposed in a subtitle D facility when they no longer exhibit a characteristic. Having a generator certify to an off-site subtitle D facility that the waste no longer exhibits a characteristic adds little or nothing to the information the disposal facility needs to know to dispose of the waste. That is, the disposal facility already must determine that the waste no longer exhibits a characteristic. Since under the present rule, sending the tracking forms to subtitle D facilities could normally have only the counterproductive effects discussed in the previous paragraph, EPA has determined that the tracking forms should not accompany shipments from generators to subtitle D facilities. As noted below, the Agency is adopting the same approach for any shipments to subtitle D facilities, so that a treatment facility that has treated a characteristic waste to meet a treatment standard also would not send tracking documents to a subtitle D disposal facility.) EPA realizes that some of the treatment standards in today's rule, notably those for reactive cyanides and pesticides, and the standards for characteristic wastes that are treatment methods, would generally result in treatment below characteristic levels. In these cases, the tracking documents would add information useful to a subtitle D facility. EPA is concerned enough about potential confusion and disruption of subtitle D disposal practices, however, that at this time the Agency believes it the better decision not to require tracking documents for this set of wastes to go to subtitle D facilities.

By deciding that tracking documents for prohibited characteristic wastes that no longer exhibit a characteristic should not go to subtitle D facilities, the Agency is not deciding that notifications and certifications should not be prepared for such wastes. The Agency's concern is where those notifications and certifications are sent. EPA believes, and is requiring, that the notifications and certifications be sent to the appropriate EPA Regional Administrator or his delegated representative, or to a state authorized to implement the land disposal restrictions. The person preparing the notification and certification must also include the identity and address of the facility where the treated waste is sent, including the address. This is the approach the Agency adopted in an analogous circumstance where sending notifications and certifications to the ultimate disposer would be counterproductive or otherwise be ill-advised. See § 268.7(b)(8) and 53 FR 31198 (Aug. 17, 1988) (notifications and certifications of persons treating hazardous wastes to produce hazardous waste-derived products that are to be used in a manner constituting disposal are to send the notifications and certifications to EPA or to an authorized state, not to the ultimate user of the hazardous waste-derived product). By requiring notifications and certifications to be prepared, EPA is also assuring that a record is kept that the characteristic waste has been treated to meet the standard and not impermissibly diluted. Generators (or treatment facilities, see below) would also have to certify that these requirements were satisfied. Thus, the key objectives of the notification and certification provisions are satisfied.

EPA is making some slight modifications in the notification form that would be sent to EPA (or to an authorized state). This is because the existing notification form refers to the waste's ID number and manifest number when shipped. Since wastes no longer exhibiting a characteristic have neither an ID number nor a manifest number, some small modifications are necessary. While the notification form would not contain hazardous waste codes, it must contain a complete and accurate description of the waste, including its former hazardous waste classification. In addition, although a manifest number would not be included, the notifications must clearly identify the facility receiving the waste.

EPA is not amending the tracking requirements for those characteristic wastes that still exhibit a characteristic when they are sent off-site. All of the normal § 268.7(a)(1) notice requirements fit this situation (i.e. the waste has an ID number; it does have to have a manifest, etc.) and do not require any change. The tracking document also would be going to a subtitle C facility so that none of the counterproductive effects discussed above with respect to subtitle D facilities would occur. Thus, no changes to existing rules are required.

The following examples illustrate how the revised tracking requirements would apply to generators of characteristic wastes:

1. Generator A generates a D008 nonwastewater that is sent off-site to a treatment facility.

The generator would prepare a § 268.7(a)(1) notice which would set out the EPA hazardous waste number, treatment standards, manifest number, and any waste analysis data. Because the waste is still hazardous, no revised notice is necessary.

2. Generator B generates a D008 nonwastewater that is not a spent lead acid battery. The generator treats the waste on-site to meet the treatment standard and then sends it off-site for disposal in a subtitle D landfill.

Generator B would have to prepare a notice and certification to document that the waste has met the treatment standard and has not been diluted impermissibly. Rather than send the notification and certification to a subtitle D facility, the generator would send it instead to the EPA Regional Office or to an authorized state. Included on the notification would be the identity and location of the subtitle D facility where the waste has been sent.

C. Tracking Provisions Applicable to Treaters

EPA is adopting the same approach for treaters of characteristic wastes as it is for generators. Thus, tracking documents for shipments of characteristic wastes that meet a treatment standard, and therefore no longer exhibit a characteristic of hazardous waste, would be sent to EPA or an authorized state (along with information documenting the receiving facility's location), not to a subtitle D facility. The reasons are the same as those for generators discussed above. EPA is also making the same slight

adjustments in the notification requirement.

The following examples illustrate how the amended rules would apply to treaters:

1. Treater A receives a D007 nonwastewater that it treats to meet the treatment standard and sends to a subtitle D landfill. The treater also generates a wastewater in the course of treatment that does not exhibit a characteristic.

The treater must prepare a notice and certification which it would send to the EPA Regional Office or to an authorized state. The wastewater generated during treatment is not a prohibited waste because it is a new treatability group whose status as a non-prohibited waste is determined when it (i.e. the new treatability group) is generated. Therefore, part 268 does not apply to the wastewater.

2. Treater B receives a high TOC ignitable waste that it incinerates. The ash, which no longer exhibits a characteristic, is sent to a Subtitle D. landfill.

The treater would prepare a notification and certification and send them to EPA or to an authorized state, as in the previous example. At least at this time, the Agency is not requiring that tracking documents be sent to subtitle D facilities, even when the treatment standard is a designated method.

D. Land Disposal Facilities

Under existing rules, subtitle C disposal facilities receiving prohibited wastes must keep copies of the notice and certification prepared by the generator and/or the treater, must test wastes (or waste extracts) at a frequency specified in their waste analysis plan (as modified in today's rule), and must dispose of certain types of wastes in minimum technology units. Section 268.7(c) (1), (2), and (3). These requirements do not fit well for the characteristic wastes prohibited in today's rule. The requirement of disposal in minimum technology units does not have any applicability at all. Moreover, if a land disposal facility is a subtitle D facility receiving non-hazardous waste, EPA does not believe that testing requirements are appropriate to implement today's rule. These facilities are already barred from accepting hazardous waste and so must ascertain if the wastes they are receiving exhibit a characteristic. Thus, since few of the treatment standards adopted today require treatment to levels below the characteristic, the Agency believes that existing controls to ensure against receipt of hazardous waste will constitute sufficient corroborative testing by a disposal facility. The Agency is thus indicating that the requirements of § 268.7(c) do not apply to Subtitle D disposal facilities receiving wastes that no longer exhibit a characteristic.

E. Changes in Certification to Reflect Dilution Prohibition

EPA is also amending the certifications of compliance required of treaters and generators to state that the treatment standard was not achieved by a form of impermissible dilution. This requirement, of course, is already contained in § 268.3 and today's amendment simply includes a reference to this requirement in the certification. (The existing certification for treatment facilities in fact refers to the dilution prohibition, but does so in an overbroad manner by referring to all dilution, rather than only impermissible dilution. EPA is thus modifying this reference in today's rule.)

G. The Dilution Prohibition as it Applies to Centralized Treatment

1. Background

EPA discussed the issue of permissible and impermissible dilution of prohibited wastes at length in previous rulemakings. EPA's existing rules state that prohibited wastes cannot be diluted in order to circumvent a statutory or regulatory prohibition or effective date. 40 CFR 268.3.[18] The rules also generally discourage aggregation of wastes not amenable to cotreatment by providing that when wastes with different standards for a common constituent are combined for purposes of treatment, the treatment residue must meet the lowest applicable treatment standard. 40 CFR 268.41(b).

In interpretive preamble discussions, the Agency explained that these rules are not intended to discourage legitimate centralized treatment, and that aggregation of wastes preceding legitimate centralized treatment is not considered to be impermissible dilution. See *e.g.*, 52 FR 25766 (July 8, 1987) and other notices there cited. However, the Agency noted that centralized treatment of incompatible wastestreams was not legitimate treatment and constitutes impermissible dilution. *Id.* For example, it is impermissible dilution to aggregate a heavily concentrated organic solvent for which incineration is the appropriate treatment technology with less concentrated solvent streams for which biological treatment is appropriate.[19]

In this rulemaking, EPA believes that it is a necessary and responsible action on the Agency's part to indicate how these existing rules apply when prohibited characteristic wastes are involved. Contrary to the views of some of the commenters, this is not a new issue unrelated to the general substance of the Third Third rulemaking. Absent discussion, the existing rules would still apply to prohibited characteristic wastes, but the regulated community would be unaware of how the Agency interpreted their application and would be potentially unable to determine how to conduct their operations in order to comply with the dilution prohibition. EPA also believes that further clarification of the dilution rules with respect to prohibited listed wastes is warranted.

2. Summary of Proposal

EPA's proposal dealt with two particular issues. The first was the question of what constitutes legitimate treatment as opposed to impermissible dilution. The Agency indicated that any dilution that failed to meet the section 3004(m) standard of substantially reducing the prohibited waste's toxicity or mobility would be impermissible, and further proposed to quantify this statutory standard by indicating that there must be some actual reduction in the prohibited waste's toxicity or mobility as a result of treatment. 54 FR 48494. To satisfy this test, the Agency indicated at a minimum that there would need to be actual reduction through treatment of at least one BDAT constituent for each prohibited waste that is treated. *Id.* EPA further proposed that any dilution of a prohibited waste to render it non-hazardous, in lieu of treating, would be considered impermissible. *Id.* at 48495. The Agency solicited comment, however, on whether dilution could be considered a legitimate form of treatment for certain prohibited characteristic wastes. *Id.* at 48496.

These proposals were the focus of many of the comments, most dealing with the implications for wastewater

[18] Although section 268.3 is written in terms of "restricted" hazardous wastes, it applies equally to the narrower class of prohibited hazardous wastes. See 54 FR 38968 (Sept. 6, 1989) explaining the applicability of the dilution prohibition.

[19] EPA notes that its authority to promulgate a dilution prohibition rests not only on the land disposal restriction statutory provisions and Congressional directives (see in particular section 3004(m) and related statutory requirements for EPA to establish pretreatment standards as a condition to land disposal; see also H. Rep. No. 198, 98th Cong. 1st Sess. 38 (1983) and S. Rep. No. 284, 98th Cong. 1st Sess. 17), but in addition, the more general authority in section 3004(a)(3) to establish treatment standards "as may be satisfactory to the Administrator" and "as may be necessary to protect human health and the environment".

treatment systems that include land-based treatment (often biological treatment ponds) or storage (for example, holding ponds for corrosive wastes that have been neutralized by dilution). Commenters also correctly viewed this issue as being intertwined (at proposal) with the implications of requiring treatment of characteristic wastes below the characteristic levels. More broadly still, the issue presents another aspect of the question of whether to determine if wastes are prohibited at the point of generation or at the point of disposal.

3. Today's Action

The existing rules on dilution and EPA's interpretive statements regarding those rules indicate that the dilution prohibition has a two-fold objective: (1) To ensure that prohibited wastes are actually treated; and (2) to ensure that prohibited wastes are treated by methods that are appropriate for that type of waste. EPA has acknowledged that prohibited wastes which are aggregated are not diluted impermissibly if they are treated legitimately in centralized treatment systems, irrespective of the dilution inherent in such a system. Thus, if "dilution" is a legitimate type of treatment, or a necessary pretreatment step in a legitimate treatment system, such dilution is permissible. Conversely, prohibited wastes that are "treated" by inappropriate methods, or sent to treatment systems that do not treat the wastes, are diluted impermissibly.

In applying these principles to characteristic wastes, EPA encountered two major difficulties: first, the interface with regulatory systems established pursuant to the Clean Water Act and Safe Drinking Water Act, and second, difficulties in being able to quantify the proposal in a meaningful way. In section III.D above, we have already discussed the potential difficulties of integrating a full-scale dilution prohibition with the Clean Water Act's NPDES and pretreatment regulations, and the Safe Drinking Water Act's UIC program. We explain below the attempts EPA made to quantify the proposed standard, and the obstacles the Agency encountered.

The Agency's proposal to require reduction of a BDAT constituent as a means of evaluating if impermissible dilution has occurred did not indicate how much reduction would be deemed adequate, and thus without further elaboration not only fails to provide clear guidance but also potentially fails to achieve the objective of assuring that wastes are treated by an appropriate treatment method. More importantly, quantifying the extent of removal necessary to be considered legitimate treatment leads to a very complicated system given the number of prohibited wastes, treatability groups, treatment methods and treatment train configurations.

Given these problems and complications, EPA has decided that the most constructive course is to provide additional interpretive guidance on the existing dilution prohibition contained in § 268.3, and to explain more fully how those rules would apply in specific situations. We also explain again how we have determined to deal with the interface between RCRA and other wastewater regulatory programs.

a. *The existing dilution prohibition ordinarily would not apply to prohibited characteristic wastes generated and managed in treatment systems regulated by the CWA or SDWA.* As explained in a previous section, EPA has determined in most cases not to apply a dilution prohibition to characteristic wastes that are generated and managed in treatment systems regulated under the CWA or SDWA. EPA believes, however, that where the Agency has established a method as the treatment standard for a characteristic waste, and that where application of that method is consistent with and promoting of the objectives of the Clean Water Act or the Safe Drinking Water Act programs, then the method of treatment attaches to the waste at the point of generation, and dilution to change the treatability group to avoid application of the method is impermissible. For example, in this rule, this is true of the ignitible nonwastewaters containing greater than 10% TOC and the EP toxic pesticide wastewaters (D012–17) if these wastes are managed in wastewater treatment systems regulated under the Clean Water Act. The treatment method for these wastes is incineration, fuel substitution, or some type of wastewater treatment technology that destroys organics. Not only are these wastes amenable to conbustion treatment (or other treatment that destroys organics), but they typically contain high concentrations of toxic organic constituents whose destruction furthers the RCRA goal of decreasing waste toxicity and minimizing threats from land disposal.

Prohibiting dilution of these wastes (*i.e.*, requiring application of a specified treatment method) is entirely consistent with the existing regulatory framework of CWA's NPDES/pretreatment programs. For example, the 10% TOC ignitible wastes are inappropriate for wastewater treatment as they would overwhelm the capacity of most biological treatment systems. (As noted in the preamble section describing the D001 treatment standards, EPA in fact developed the 10% TOC cutoff for ignitible wastes based on the outer limit of design capacity for biological treatment systems.) The Clean Water Act effluent limitations guidelines and the standards addressing these types of wastes already contemplate that these wastes will not be diluted, but rather will be treated in the appropriate manner.

The logic that forces this decision for these wastes in a NPDES/pretreatment Clean Water Act system is not equally persuasive in the case of wastes disposed of by injection. As noted in section III.D, Class I deep wells inject below the lowermost geological formation containing an underground source of drinking water. Deep wells are not currently injecting wastes that contain any of the pesticide constituents found in D012–17 characteristic wastes. Additionally, there is not a design concern of overwhelming the biological treatment system in the deep well scenario. In this instance, it is illogical to force deep wells to utilize a specified method as there is little concomitment environmental or technical benefit through its utilization. Therefore, in today's final rule, the Agency is exempting deep wells from specified methods and the dilution prohibition as long as the characteristic is removed before disposal.

b. *Dilution is considered to be an acceptable method of treatment for non-toxic characteristic wastes.* Although EPA proposed that the dilution prohibition would cover all characteristic wastes, the Agency specifically noted that dilution might be an acceptable type of treatment for non-toxic characteristic wastes and solicited comment on the issue. 54 FR 48496. After considering the comments, the Agency has determined that for non-toxic hazardous characteristic wastes (*i.e.*, wastes that exhibit a hazardous physical or chemical property), it should not matter how the non-toxic characteristic property is removed so long as it is removed. Thus, dilution is an acceptable treatment method for such wastes. (This issue is discussed in more detail in the sections on each particular characteristic waste.). The Agency realizes that this approach does not fully address the potential problem of toxic constituents that may be present in such wastes, nor encourages minimization or recovery of non-toxic characteristic hazardous wastes. EPA has determined that these potential problems should be addressed, if at all,

in other rulemakings (or potentially in a reauthorized statute) and are too difficult to resolve in this proceeding, given the extraordinary pressures and limited review time imposed by the May 8 statutory deadline.

EPA also notes that it considers high TOC ignitable nonwastewaters, reactive cyanide wastes, and reactive sulfide wastes to be toxic characteristic wastes. As noted above, the high TOC ignitables have been shown to frequently contain high concentrations of organic toxicants. Reactive cyanide and sulfide wastes obviously contain toxic constituents. Thus, dilution would not be an appropriate method of treatment for any of these.

c. *Determining when types of treatment (including centralized treatment) involving dilution are permissible.* The Agency is able to provide limited additional guidance today on the issue of when treatment methods involving dilution are permissible. The issue frequently arises when prohibited wastes are aggregated for purposes of treatment. First, if the wastes are all legitimately amenable to the same type of treatment, and this method of treatment is utilized for the aggregated wastes, the aggregation step is not impermissible dilution. Thus, it is permissible (and normally desirable) for prohibited organic-containing wastes that are suitable for combustion to be aggregated before combustion even though the concentration of organics in some of the wastes decreases. (See, for example, the discussion for wastes K048–52.) On the other hand, as noted above, aggregation of high TOC ignitable wastes with ignitable wastewaters for centralized biological treatment is not permissible. Biological treatment is inappropriate for the high TOC ignitable wastes, and the aggregation step merely dilutes the high TOC stream.

As noted above, EPA is unable to quantify across-the-board what types of treatment are appropriate for particular prohibited hazardous wastes (both listed and characteristic). Clearly, as stated at proposal, units would have to be doing some treatment (*i.e.*, removing toxicity or mobility of BDAT constituents). In addition, treatment units would have to be treating wastes that are amenable to treatment in that type of unit or by that type of treatment, or, in the case of centralized treatment units treating aggregated wastes, appropriately combining wastes for common treatment. An example of type of treatment that is inappropriate for treatment of certain prohibited wastes would be biological treatment systems used to treat prohibited wastes having treatment standards for metals. In these systems, metal removal is incidental and nowhere as efficient as systems designed to treat metals; biological treatment systems are designed solely for organic treatment. (EPA notes, however, that since it is not applying dilution rules for most characteristic wastewaters, the above example would only apply in cases when a listed prohibited metal-bearing wastewater—a wastewater with treatment standards for metals—was being treated in a biological treatment unit. If this hypothetical biological treatment were a surface impoundment, EPA would not view it as satisfying the requirement of section 3005(j)(11) and § 268.4 that it be conducting "treatment." See discussion at 52 FR 25778–79 (July 8, 1987) where EPA determined in an analogous circumstance that impoundments which primarily evaporate hazardous constituents do not qualify as section 268.4 impoundments which may receive wastes that have not met the treatment standard.) The clearest objective indication that proper treatment for a prohibited waste is being conducted is if the treatment is the same type as that on which the treatment standard is based. Thus, any aggregation before such treatment would ordinarily not be considered to be impermissible dilution. However, other forms of treatment may also be appropriate. Such determinations will be made on a case-by-case basis.

d. Dilution to remove a characteristic. EPA proposed that prohibited hazardous wastes could not be diluted by impermissible means to render them non-hazardous, even though the waste resulting from dilution would not have to be managed in a subtitle C unit. 54 FR 48495. Although this possibility exists for all prohibited wastes—both those that are listed (i.e., dilution to achieve delisting levels) and those that exhibit characteristics—the issue arises most often with respect to characteristic prohibited wastes.

EPA is finalizing this approach in the final rule, modified, however, by a number of principles discussed above. Thus, since it is permissible to dilute prohibited non-toxic ignitable, reactive, and corrosive wastes, it is permissible to remove the characteristic from such wastes by this means. Second, dilution of prohibited characteristic wastewaters is normally permissible because the Agency does not wish to disrupt existing regulatory programs developed under other statutes for such wastewaters. These two modifications address the concerns raised by many of the commenters.

For other situations, however, dilution to remove a prohibited waste's characteristic (or to render it delistable) is used "as a substitute for adequate treatment to achieve compliance with [a treatment standard]", and so falls within the express terms of the § 268.3 dilution prohibition. Furthermore, as the Agency explained in detail in the proposal, if the dilution prohibition were not to apply in such circumstances, the authority Congress granted the Agency to establish treatment standards for characteristic wastes would be essentially meaningless. Thus, EPA adheres to the position that the act of impermissibly diluting a prohibited waste so that it no longer exhibits a characteristic (or is rendered delistable) is illegal.

5. Examples

a. Facility A generates an EP toxic wastewater that it mixes in tanks with other wastewater so that the characteristic is removed. After mixing, the aggregated wastewaters are discharged to waters of the United States.

The dilution prohibition does not apply because the wastewater is not a prohibited waste; it is not being land disposed. In addition, the Agency has determined not to apply the dilution prohibition rules to characteristic wastewaters (with the exception of those subject to certain treatment methods that are managed in Clean Water Act facilities).

b. Facility B generates a wastewater that is corrosive and EP toxic for a pesticide. It is mixed in tanks with other wastewaters generated at the same facility so that both characteristics are removed. The aggregated mixture is then injected into a Class I UIC well. While a restricted waste at the point of generation, these wastes are not prohibited because they are injected below the characteristic level in a Class I injection well. See § 268.1(c)(3).

c. Facility C generates a wastewater that is a listed hazardous waste that contains metals for which EPA has established treatment standards. It aggregates this waste with organic wastewaters that are generated on-site so that the metal levels in the aggregated wastewaters are below the treatment standard. The aggregated mixture is then sent to a surface impoundment for biological treatment and then discharged to waters of the United States.

The dilution prohibition would be violated. EPA does not consider

biological treatment to be an appropriate mode of treating metal-bearing toxic wastes (*i.e.*, wastes for which there are treatment standards for inorganic hazardous constituents). Any metal removal is incidental because the treatment technology is not designed to remove metals. In addition, removals are at a rate that is considerably less efficient than could be achieved by chemical precipitation or other forms of wastewater treatment. Thus, in the example, dilution would be used as a substitute for treatment of the listed waste and would therefore be illegal dilution and not treatment. (See 54 FR 38968 (Sept. 6, 1989) (dilution prohibition applies to wastes managed in section 268.4 impoundments).)

d. Facility D generates an EP toxic nonwastewater that it stabilizes to meet the treatment standard. The waste's volume increases 400 per cent as a result of stabilization.

Although there are too few facts in this example to give a definitive answer, normally this large an increase in waste volume would indicate that the treatment standard is being achieved as a result of dilution rather than treatment, and therefore would be impermissible.

H. Applicability of Today's Final Rule to Mineral Processing Wastes

Section 3001(b)(3)(A)(ii) of RCRA excludes from the hazardous waste regulations (pending completion of studies by the Agency) solid wastes from the extraction, beneficiation and processing of ores and minerals. On September 1, 1989, EPA published a final rule (54 FR 36592) that narrowed the scope of this exclusion for 25 enumerated wastes that meet the exclusion criteria of "high volume/low hazard," as specified in the September 1 rule. EPA determined that five specific mineral processing wastes clearly remain within the scope of the exclusion, and 20 additional specified mineral processing wastes remain within the exclusion pending collection of further volume and hazard data. All previously excluded mineral processing wastes, other than these 25 specified wastes, that exhibit one or more of the characteristics of hazardous waste will no longer be excluded from the hazardous waste regulations when the final rule became effective on March 1, 1990. On January 23, 1990 (see 55 FR 2322–2354), EPA published another final rule removing an additional five of these wastes from the exclusion based on additional volume and/or hazard data. This final rule becomes effective on July 23, 1990.

EPA believes that these previously excluded wastes are "newly identified" for the purpose of determining applicability of the land disposal prohibitions. Although technically the wastes are not being identified by a new characteristic, they are being brought into the Subtitle C system after the November 8, 1984 enactment of HSWA. A permissible interpretation of RCRA section 3004(g)(4), which is ambiguous as to whether it applies to wastes first brought into the Subtitle C system after 1984 due to regulatory re-interpretation, is that wastes brought into the system after the 1984 RCRA amendments may be prohibited from land disposal under a different schedule than those wastes that were hazardous on the date of enactment of HSWA, and also are not subject to the statutory hard hammer. The policy reasons for preferring this interpretation are those that prompted Congress to establish a separate prohibition schedule for other newly identified and listed wastes: the need to study such wastes separately, and prioritization of hammer dates. Consequently, because these wastes are considered to be newly identified, the Agency must develop treatment standards for them within six months of their being identified as hazardous wastes (RCRA section 3004(g)(4)(C)).

However, as stated above, these wastes are hazardous because they exhibit one or more of the characteristics of hazardous waste. Today's rule promulgates treatment standards for characteristic wastes. A question, therefore, is whether the treatment standards for characteristics should apply to these mineral processing wastes recently determined not to fall within the Bevill exclusion. Put another way, although as newly identified wastes they are not subject to the hard hammer, EPA has the choice of whether to apply the treatment standards for characteristic wastes to them at this time.

The Agency has not yet performed the technical analyses necessary to determine if the treatment standards promulgated today as BDAT for EP toxic hazardous wastes or other characteristic hazardous wastes can be achieved in treating the various mineral processing wastes. Therefore, EPA has determined that these newly identified mineral processing wastes are *not* subject to the BDAT standards promulgated today for characteristic hazardous wastes. The Agency plans to study the mineral processing wastes in the future to determine BDAT for these newly identified hazardous wastes.

There are circumstances when newly identified mineral processing wastes can, however, be subject to existing hazardous waste prohibitions. In particular, if the mineral processing waste is mixed with other prohibited wastes (*i.e.*, any prohibited solvent, dioxin, First or Second Third hazardous waste), it becomes subject to the prohibition for the prohibited waste with which it is mixed. EPA also solicited comment on applicability of California list prohibitions, but has determined that these prohibitions will not apply. See section III.F for a discussion of this issue.

Whether any of these prohibitions would have immediate regulatory effect would be determined by the authorization status of the State in which the waste is managed. Because the final rules removing wastes from the scope of the Bevill exclusion are not being adopted pursuant to HSWA, they do not take effect immediately in authorized States. Thus, in these States, these mineral processing wastes would only be hazardous wastes if they are included within the scope of the State's authorized program. If they are not, they would not be hazardous wastes until an amended State's program including them is authorized. Only after authorization would the land disposal prohibitions apply in that State. These mineral processing wastes would be hazardous wastes in unauthorized States as soon as the rule removing them from the exclusion becomes effective. At that time, any land disposal prohibitions that apply to them also would take effect.

The Agency, in the proposed rule, solicited comment on whether the BDAT treatment standards proposed for the EP toxic metals are appropriate for the newly identified mineral processing wastes. Of the comments received, almost all supported EPA's position that the mineral processing wastes are sufficiently different from other characteristic wastes to warrant additional analysis, and that the statutory hammer and the California list prohibitions apply only to those wastes regulated as hazardous at the time of the HSWA enactment.

Several commenters argued against the Agency's position on mineral processing wastes. One commenter stated that since EPA has extensive information available from the listing process, that should be sufficient to develop BDAT treatment standards. However, data collected and analyzed for the purpose of listing a waste as hazardous are different from those required to perform BDAT analyses. In addition, most of the analyses

performed have been to determine if the mineral processing wastes fall within the scope of the Bevill Amendment (*i.e.*, high volume/low hazard). Thus, the Agency does not agree that it has sufficient data to determine BDAT standards for mineral processing wastes.

Another commenter argued that these wastes were improperly excluded from regulation in the first place by an illegal interpretation of the Bevill Amendment in 1980, so should not be considered newly identified at this time. The Agency disagrees with the commenter that mineral processing wastes cannot be considered newly identified wastes. These wastes have become subject to the subtitle C regulations subsequent to the enactment of HSWA, and thus need not be subject to the hard hammer, nor must treatment standards for characteristic hazardous wastes be applied to them in this rulemaking. Certainly, there is no indication in either the statute or the legislative history that in creating a 66-month deadline for characteristic wastes, Congress expected the Agency to address wastes within the scope of the Bevill Amendment at the time of HSWA's promulgation.

7. Generator Notification Requirements

The generator notification requirements set forth in 40 CFR 268.7 specify that when the generator has determined, either through testing or through knowledge of the waste, that the waste is restricted and does not meet the applicable treatment standards, the generator must, with each shipment of waste, notify the treatment facility in writing of the applicable treatment standards and prohibition levels. This notice must include the EPA Hazardous Waste Number, the corresponding treatment standards and all applicable prohibitions set forth in 40 CFR 268.32 or RCRA section 3004(d), the manifest number associated with the shipment of waste, and waste analysis data, where available (40 CFR 268.7(a)(1)). If the generator has determined that the waste being shipped is restricted, but can be land disposed without further treatment, the generator must submit to the land disposal facility the same information, as well as a certification stating that the waste meets the applicable treatment standards (40 CFR 268.7(a)(2)). (EPA reiterates that such determination must, of course, be accurate. Thus, failure to accurately determine a waste's status as restricted is a violation of § 268.7 (a)(1) or (a)(2), as well as a potential violation of other provisions.)

The Agency had received, prior to the Third Third proposed rule, a number of questions on whether the actual treatment standards (*i.e.*, the actual number or method) must be placed on the generator notification form, or if it is sufficient to reference the appropriate treatment standards by citation of the applicable part of 40 CFR 268.41, .42, or .43. EPA's interpretation has been that all applicable treatment standards must be listed completely on the generator notification form sent to the treatment, storage or disposal facility. A number of these pre-proposal commenters had indicated that they believe the current regulations can be interpreted to allow referencing, rather than listing the specific treatment standards as part of the generator notification. The commenters argued that referencing the standards serves the same purpose as listing the specific treatment standards. Furthermore, they stated that the notification forms are becoming longer, more complicated, and unwieldy as new wastes and corresponding treatment standards are added to the list of wastes restricted from land disposal, and thus listing each treatment standard on the notification form imposes an unnecessary burden on generators.

As proposed in the Third Third notice on November 22, 1989 (54 FR 48496), the Agency today is amending 40 CFR 268.7 to allow referencing the Code of Federal Regulations (CFR) rather than listing each treatment standard. EPA solicited comment in the Third Third proposed rule on this action to determine if the regulated community anticipated any problems with referencing of the CFR, and to determine the effect this action would have on hazardous waste generators. The comments EPA received on the proposal were overwhelmingly in favor of allowing referencing the CFR. Commenters stated that this action will significantly reduce the paperwork involved in handling the waste shipments, reduce transcription errors, and in no way cause harm to the environment.

Although EPA today is allowing such references to the CFR, the following information also must be included in the reference: the EPA Hazardous Waste No., the subcategory of the waste code (*e.g.*, D003, reactive cyanide subcategory), the treatability group(s) of the waste(s) (*e.g.*, wastewater or non-wastewater), and the CFR sections and paragraphs where the applicable treatment standards appear. In addition, where treatment standards are expressed as specified technologies in § 268.42, the 5-letter treatment code found in Table I of § 268.42 (*e.g.*, INCIN, WETOX) must be listed. Omissions or inaccuracies in listing any of these items will be considered a violation. In addition, the Agency emphasizes that the change to 40 CFR 268.7 allows referencing of the CFR in lieu of only the individual treatment standards; all other § 268.7 information is still required in the notification.

EPA notes that these revised notification requirements also apply to treatment and storage facilities, with the following exceptions. These changes do not apply to generators, or treatment or storage facilities that ship spent solvents (F001–F005), multi-source leachate (F039) or California list wastes off-site to a disposal facility. These waste categories each contain a number of individual constituents or waste groups (*e.g.*, the waste code for multi-source leachate (F039) contains 230 constituents). Therefore, referencing only the CFR section in lieu of the treatment standards would not provide the disposal facility with meaningful information regarding which constituents might reasonably be expected to be present in the waste. The same is true for California list wastes and spent solvents. For each of these wastes, therefore, all applicable waste groups and individual constituents actually must be listed on the notification.

In addition, some pre-proposal commenters raised concerns about notification requirements with regard to shipments subject to the March 24, 1986 small quantity generator (SQG) rule. This rule, specifically 40 CFR 262.20(e), exempts SQGs (100–1000 kg/mo.) with recycling tolling agreements (as defined in 40 CFR 262.20(e)) from the full Part 262 manifesting requirements. EPA received a number of comments supporting the proposed approach, and today is amending § 268.7 to allow a one-time notification and certification for SQG shipments subject to tolling agreements. Such agreements, as well as the one-time notifications and certifications, must be maintained by the generator for three years after termination or expiration of the agreement in keeping with the provisions of 40 CFR 262.20(e)(2).

The Agency is promulgating this amendment because it believes the subsequent handler of the waste under the contractual tolling arrangement has sufficient notification and knowledge of the nature of the wastes being handled. Tolling agreements provide for the collection and reclamation of a specified waste and for redelivery of regenerated material at a specified frequency. The Agency believes that since the same waste is picked up at regular intervals, one notice will suffice for the duration of

the agreement to apprise the subsequent handler of the land disposal restrictions applicable to the waste.

J. Waste Analysis Plans and Treatment/Disposal Facility Testing Requirements

In the proposed rule, EPA noted that §§ 268.7 (b) and (c) currently require treatment and disposal facilities to test their wastes in order to ensure that they are in compliance with applicable treatment standards and prohibition levels. EPA also noted that these provisions require such testing to be performed according to the frequency specified in the facility's § 264.13 or § 265.13 Waste Analysis Plan (WAP). Although §§ 264.13 and 265.13 require that waste analyses contain enough information to allow the owner/operator to comply with the 40 CFR 268 requirements, the Agency noted that a comment found in both of these sections has created implementation problems. The comment states, "the owner or operator of an off-site (treatment, storage, or disposal) facility may arrange for the generator of the hazardous waste to supply part or all of the (waste analysis) information." This language has been construed erroneously as precluding EPA (or an authorized State) from requiring the owner/operator to conduct a detailed chemical and physical analysis of the waste where the generator has supplied the owner/operator with such waste analysis information. Although EPA stated in the proposal that it has authority to require owner/operators to test their wastes in such cases, the Agency stated its preference for removing any ambiguities and modifying the regulations in order to clarify EPA's intent.

The Agency noted in the proposal its belief that ordinarily, treatment and disposal facilities should do some corroborative testing to ensure compliance with LDR treatment standards and prohibitions. Although there are certainly situations where test data submitted by the generator, or the knowledge of the generator, may constitute an essential part of the necessary information, EPA's proposal was premised on a need to ensure that the LDR requirements are met *prior* to disposal. The Agency also noted that such corroborative testing provides records that may be useful in ascertaining compliance with LDR requriements. Thus, EPA stated that treatment and disposal facilities normally should do periodic independent corroborative testing of prohibited wastes, even if the generator also tests the waste or otherwise certifies that it is eligible for land disposal.

Given this context, the Agency proposed two approaches for specifying the circumstances under which EPA could require corroborative testing. The first approach would allow off-site facilities to arrange for the generator and/or treater of wastes to supply all or part of the waste analysis information only if an EPA-approved WAP affirmatively allows the generator and/or treater to supply this information. Since interim status facilities do not have their WAPs approved until their permit applications are reviewed by EPA (or the authorized State), such facilities would no longer be able to rely upon generator data under this approach. Under the second approach, the Regional Administrator or his designate would determine the owner/operator's testing frequency, but such facilities would be required to conduct waste analyses at least once a year. Since such an approach would be self-implementing, no revisions to existing permits would be necessary.

Numerous commenters pointed out the advantages and disadvantages of both approaches. The primary issues raised by commenters related to the flexibility and resources associated with the proposed approaches. Several commenters supported the flexibility that the first approach would provide. Individual facility circumstances can be considered, which the commenter, believed would result in appropriate testing frequencies. The Agency agrees with the commenters and continues to believe that the frequency of testing is best determined on a case-by-case basis by the permit writer. This is because the range of variables (*e.g.*, variety of wastes managed, different types of waste matrices, number of processes invovled) is too broad to justify a single national testing frequency. However, evaluating the appropriate testing frequencies for every treatment and disposal facility can be very resource-intensive, a task that likely would take several years to complete. Some commenters expressed a preference for specific minimum testing frequencies, in part to establish a baseline level from which to depart. As stated above, a required testing frequency is difficult to specify for all facilities, and would be excessive and redundant in some situations while not being protective enough in others. To address this problem, the Agency is developing guidance to help identify what testing frequency, based on site-specific considerations, is reasonable and appropriate for treatment and disposal facilities.

Several commenters stated that corroborative testing by treatment and disposal facilities is unnecessary where generators supply such waste analysis data. Some of these commenters felt that testing should be required only where the generator does not supply testing data (*i.e.*, where the generator supplies waste characterization data based only on his knowledge of the waste or waste generation process). EPA disagrees with the commenters, and notes that the D.C. Circuit, in upholding EPA's § 268.7 testing framework, has expressed its support for treatment and disposal facility corroborative testing requirements:

> [I]t is the treatment facility's job to *transform* waste otherwise deemed too dangerous to permit into landfills into acceptable form. It is therefore not irrational for the EPA to introduce a backup, arguably "redundant" testing stage for these wastes requiring treatment and even to consider this a "critical" stage in the process.

886 F.2d at 370.

The court also noted that such corroborative testing is necessary for dispoasl facilities:

> [J]ust prior to land disposal, waste must be vigorously tested to confirm that it is what others have represented it to be and that it may permissibly be land disposed.

Id.

Given these concerns, the Agency today is promulgating an approach that combines elements of both the proposed approaches. EPA is revising the comment in §§ 264.13 and 265.13 to implement this approach.

Under the final approach, treatment and disposal facilities may generally rely on information provided to them by generators or treaters of the waste. However, treatment and disposal facilities must conduct periodic detailed physical and chemical analysis on their waste streams to assure that the appropriate part 268 treatment standards are being met. Specifically, today's final rule amends the comment in §§ 264.13 and 265.13 to make it clear that the restricted waste testing requirement (or other frequency approved by the Agency) is not superseded by the ability of the facility to rely on information supplied by the generator or treater. Also, with today's change, § 264.13 more clearly specifies that EPA may, through the permit, require the owner or generator of a treatment or disposal facility to conduct periodic chemical and physical analysis prior to treatment or other management of wastes.