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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4. Constituents Subject to Treatment

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

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

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

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

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

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

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

5. Relationship of Soil Treatment Standards to Naturally Occurring Constituents

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

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

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

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

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

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

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

7. Availability of Soil Treatment Standards

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

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

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

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

8. Achievability of Contaminated Soil Treatment Standards

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(4) Other Indicia of Achievability for Organic Constituents

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

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

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

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

[32] Only one test was performed.

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

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

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

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

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

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

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

(5) Performance Data for Metal Contaminants

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

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

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

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

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

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

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

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

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

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

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

c. Data Submitted by Commenters

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The following examples illustrate application of LDRs to contaminated soil:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

C. Conforming and Supporting Changes

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

1. Recordkeeping Requirements

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

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

2. Definition of Soil

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

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

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

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

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

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

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

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

E. The Contained-In Policy

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

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

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

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

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

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

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

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

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

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

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

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

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

VIII. Improvements and Corrections to LDR Regulations

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

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

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

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

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

C. Clarifying Language Added to Section 268.7

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

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

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

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

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

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

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

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

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

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

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

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

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

H. Cross References in Section 268.50(e)

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

I. Mistakes in Appendices VII and VIII

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

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

J. Clarification Regarding Point of Generation of Boiler Cleanout Rinses

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

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

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

IX. Capacity Determination for Phase IV Land Disposal Restrictions

A. Introduction

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

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

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

B. Available Capacity for Surface Disposed Wastes

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

1. Stabilization

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

2. Vitrification

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

3. Metal Recovery

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

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

4. Thermal Treatment

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

F. Mixed Radioactive Wastes

Significant uncertainty exists about quantities of mixed radioactive wastes containing wastes that will require treatment as a result of today's rule. Despite this uncertainty, any new commercial capacity that becomes available will be needed for mixed radioactive wastes that were regulated in previous LDR rulemakings and whose variances have already expired. Thus, EPA has determined that sufficient alternative treatment capacity is not available, and therefore is granting a two-year national capacity variance for mixed RCRA/radioactive TC metal wastes that are newly identified (i.e., wastes, soil, or debris identified as hazardous by the TCLP but not the EP), and newly identified characteristic mineral processing wastes including soil and debris.

G. Summary

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

TABLE OF CAPACITY VARIANCES FOR PHASE IV WASTES

[Note: Capacity variances begin from the publication date]

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

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

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

A. Summary of the Proposal

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

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

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

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

B. Modifications to the Proposal

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

1. Notification

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

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

2. Conditions Under Which the Exclusion Would No Longer Apply

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

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

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

C. Other Comments

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

1. Oil Borne Facilities

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

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

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

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

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

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

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

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

5. CESQG Status

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

D. State Authorization

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

XI. Clarification of the RCRA Exclusion of Shredded Circuit Boards

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

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

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

XII. Regulatory Requirements

A. Regulatory Impact Analysis Pursuant to Executive Order 12866

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

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

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

1. Methodology Section

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

2. Results

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

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

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

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

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

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

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

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

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

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

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

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

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

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discussed below under the Regulatory Flexibility section.

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

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

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

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

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

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

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

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

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

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

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

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

B. Regulatory Flexibility

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

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

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

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

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

C. Unfunded Mandates Reform Act

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

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

D. Paperwork Reduction Act

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

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

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

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

XIII. Environmental Justice

A. Applicability of Executive Order 12898

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

B. Potential Effects

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

XIV. State Authority

A. Statutory Authority

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

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

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

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

B. Effect on State Authorization

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

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

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

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

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

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

C. Authorization Procedures

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

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

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

D. Streamlined Authorization Procedures

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

XV. Submission to Congress and General Accounting Office

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

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

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

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

XVII. National Technology Transfer and Advancement Act

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

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

List of Subjects

40 CFR Part 148

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

40 CFR Part 261

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

40 CFR Part 266

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

40 CFR Part 268

Hazardous waste, Reporting and recordkeeping requirements.

40 CFR Part 271

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

Dated: April 30, 1998.

Carol M. Browner,

Administrator.

For the reasons set out in the preamble, Title 40, chapter I of the Code of Federal Regulations is amended as follows:

PART 148—HAZARDOUS WASTE INJECTION RESTRICTIONS

1. The authority citation for Part 148 continues to read as follows:

Authority: Secs. 3004, Resource Conservation and Recovery Act, 42 U.S.C. 6901, *et seq.*

2. Section 148.18 is amended by redesignating paragraphs (a) through (f) as (c) through (h) respectively, and by adding paragraphs (a) and (b) to read as follows:

§ 148.18 Waste specific prohibitions—newly listed and identified wastes.

(a) Effective August 24, 1998, all newly identified D004–D011 wastes and characteristic mineral processing wastes, except those identified in paragraph (b) of this section, are prohibited from underground injection.

(b) Effective May 26, 2000, characteristic hazardous wastes from titanium dioxide mineral processing, and radioactive wastes mixed with newly identified D004–D011 or mixed with newly identified characteristic mineral processing wastes, are prohibited from underground injection.

* * * * *

PART 261—IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

Subpart A—General

3. The authority citation for Part 261 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, 6922, 6924(y), and 6938.

4. Section 261.2 is amended by revising Table 1 in paragraph (c)(4), paragraph (c)(3) and (e)(1)(iii) to read as follows:

§ 261.2 Definition of solid waste.

* * * * *

(c) * * *

(3) *Reclaimed.* Materials noted with a ''*'' in column 3 of Table 1 are solid wastes when reclaimed (except as provided under 40 CFR 261.4(a)(15)). Materials noted with a ''—'' in column 3 of Table 1 are not solid wastes when reclaimed (except as provided under 40 CFR 261.4(a)(15)).

* * * * *

(4) * * *

TABLE 1

	Use constituting disposal (§ 261.2(c)(1))	Energy recovery/ fuel (§ 261.2(c)(2))	Reclamation (§ 261.2(c)(3)) (except as provided in 261.4(a)(15) for mineral processing secondary materials)	Speculative accumulation (§ 261.2(c)(4))
	1	2	3	4
Spent Materials	(*)	(*)	(*)	(*)
Sludges (listed in 40 CFR Part 261.31 or 261.32	(*)	(*)	(*)	(*)
Sludges exhibiting a characteristic of hazardous waste	(*)	(*)	—	(*)
By-products (listed in 40 CFR 261.31 or 261.32)	(*)	(*)	(*)	(*)
By-products exhibiting a characteristic of hazardous waste	(*)	(*)	—	(*)
Commercial chemical products listed in 40 CFR 261.33	(*)	(*)	—	—
Scrap metal other than excluded scrap metal (see 261.1(c)(9))	(*)	(*)	(*)	(*)

Note: The terms ‘‘spent materials,’’ ‘‘sludges,’’ ‘‘by-products,’’ and ‘‘scrap metal’’ and ‘‘processed scrap metal’’ are defined in § 261.1.

* * * * *

(e) * * *

(1) * * *

(iii) In cases where the materials are generated and reclaimed within the primary mineral processing industry, the conditions of the exclusion found at § 261.4(a)(15) apply rather than this provision.

* * * * *

5. Section 261.3 is amended by revising paragraphs (a)(2)(i) and (a)(2)(iii) to read as follows:

§ 261.3 Definition of hazardous waste.

(a) * * *

(2) * * *

(i) It exhibits any of the characteristics of hazardous waste identified in subpart C of this part. However, any mixture of a waste from the extraction, beneficiation, and processing of ores and minerals excluded under § 261.4(b)(7) and any other solid waste exhibiting a characteristic of hazardous waste under subpart C is a hazardous waste only if it exhibits a characteristic that would not have been exhibited by the excluded waste alone if such mixture had not occurred, or if it continues to exhibit any of the characteristics exhibited by the non-excluded wastes prior to mixture. Further, for the purposes of applying the Toxicity Characteristic to such mixtures, the mixture is also a hazardous waste if it exceeds the maximum concentration for any contaminant listed in table I to § 261.24 that would not have been exceeded by the excluded waste alone if the mixture had not occurred or if it continues to exceed the maximum concentration for any contaminant exceeded by the nonexempt waste prior to mixture.

* * * * *

(iii) It is a mixture of a solid waste and a hazardous waste that is listed in subpart D of this part solely because it exhibits one or more of the characteristics of hazardous waste identified in subpart C of this part, unless the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subpart C of this part, or unless the solid waste is excluded from regulation under § 261.4(b)(7) and the resultant mixture no longer exhibits any characteristic of hazardous waste identified in subpart C of this part for which the hazardous waste listed in subpart D of this part was listed. (However, nonwastewater mixtures are still subject to the requirements of part 268 of this chapter, even if they no longer exhibit a characteristic at the point of land disposal).

* * * * *

6. Section 261.4 is amended by adding paragraphs (a)(9)(iii) and (a)(16) and by revising paragraph (b)(7) to read as follows:

§ 261.4 Exclusions.

(a) * * *

(9) * * *

(iii) Prior to reuse, the wood preserving wastewaters and spent wood preserving solutions described in paragraphs (a)(9)(i) and (a)(9)(ii) of this section, so long as they meet all of the following conditions:

(A) The wood preserving wastewaters and spent wood preserving solutions are reused on-site at water borne plants in the production process for their original intended purpose;

(B) Prior to reuse, the wastewaters and spent wood preserving solutions are managed to prevent release to either land or groundwater or both;

(C) Any unit used to manage wastewaters and/or spent wood preserving solutions prior to reuse can be visually or otherwise determined to prevent such releases;

(D) Any drip pad used to manage the wastewaters and/or spent wood preserving solutions prior to reuse complies with the standards in part 265, subpart W of this chapter, regardless of whether the plant generates a total of less than 100 kg/month of hazardous waste; and

(E) Prior to operating pursuant to this exclusion, the plant owner or operator submits to the appropriate Regional Administrator or State Director a one-time notification stating that the plant intends to claim the exclusion, giving the date on which the plant intends to begin operating under the exclusion, and containing the following language: ‘‘I have read the applicable regulation establishing an exclusion for wood preserving wastewaters and spent wood preserving solutions and understand it requires me to comply at all times with the conditions set out in the regulation.’’ The plant must maintain a copy of that document in its on-site records for a period of no less than 3 years from the date specified in the notice. The exclusion applies only so long as the plant meets all of the conditions. If the plant goes out of compliance with any condition, it may apply to the appropriate Regional Administrator or State Director for reinstatement. The Regional Administrator or State Director may reinstate the exclusion upon finding that the plant has returned to compliance with all conditions and that violations are not likely to recur.

* * * * *

(16) Secondary materials (i.e., sludges, by-products, and spent materials as defined in § 261.1) (other than

hazardous wastes listed in subpart D of this part) generated within the primary mineral processing industry from which minerals, acids, cyanide, water or other values are recovered by mineral processing, provided that:

(i) The secondary material is legitimately recycled to recover minerals, acids, cyanide, water or other values;

(ii) The secondary material is not accumulated speculatively;

(iii) Except as provided in paragraph (a)(15)(iv) of this section, the secondary material is stored in tanks, containers, or buildings meeting the following minimum integrity standards: a building must be an engineered structure with a floor, walls, and a roof all of which are made of non-earthen materials providing structural support (except smelter buildings may have partially earthen floors provided the secondary material is stored on the non-earthen portion), and have a roof suitable for diverting rainwater away from the foundation; a tank must be free standing, not be a surface impoundment (as defined in 40 CFR 260.10), and be manufactured of a material suitable for containment of its contents; a container must be free standing and be manufactured of a material suitable for containment of its contents. If tanks or containers contain any particulate which may be subject to wind dispersal, the owner/operator must operate these units in a manner which controls fugitive dust. Tanks, containers, and buildings must be designed, constructed and operated to prevent significant releases to the environment of these materials.

(iv) The Regional Administrator or the State Director may make a site-specific determination, after public review and comment, that only solid mineral processing secondary materials may be placed on pads, rather than in tanks, containers, or buildings. Solid mineral processing secondary materials do not contain any free liquid. The decision-maker must affirm that pads are designed, constructed and operated to prevent significant releases of the secondary material into the environment. Pads must provide the same degree of containment afforded by the non-RCRA tanks, containers and buildings eligible for exclusion.

(A) The decision-maker must also consider if storage on pads poses the potential for significant releases via groundwater, surface water, and air exposure pathways. Factors to be considered for assessing the groundwater, surface water, air exposure pathways are: the volume and physical and chemical properties of the secondary material, including its potential for migration off the pad; the potential for human or environmental exposure to hazardous constituents migrating from the pad via each exposure pathway, and the possibility and extent of harm to human and environmental receptors via each exposure pathway.

(B) Pads must meet the following minimum standards: be designed of non-earthen material that is compatible with the chemical nature of the mineral processing secondary material, capable of withstanding physical stresses associated with placement and removal, have run on/runoff controls, be operated in a manner which controls fugitive dust, and have integrity assurance through inspections and maintenance programs.

(C) Before making a determination under this paragraph, the Regional Administrator or State Director must provide notice and the opportunity for comment to all persons potentially interested in the determination. This can be accomplished by placing notice of this action in major local newspapers, or broadcasting notice over local radio stations.

(v) The owner or operator provides a notice to the Regional Administrator or State Director, identifying the following information: the types of materials to be recycled; the type and location of the storage units and recycling processes; and the annual quantities expected to be placed in land-based units. This notification must be updated when there is a change in the type of materials recycled or the location of the recycling process.

(vi) For purposes of § 261.4(b)(7), mineral processing secondary materials must be the result of mineral processing and may not include any listed hazardous wastes. Listed hazardous wastes and characteristic hazardous wastes generated by non-mineral processing industries are not eligible for the conditional exclusion from the definition of solid waste.

(b) * * *

(7) Solid waste from the extraction, beneficiation, and processing of ores and minerals (including coal, phosphate rock, and overburden from the mining of uranium ore), except as provided by § 266.112 of this chapter for facilities that burn or process hazardous waste.

(i) For purposes of § 261.4(b)(7) beneficiation of ores and minerals is restricted to the following activities; crushing; grinding; washing; dissolution; crystallization; filtration; sorting; sizing; drying; sintering; pelletizing; briquetting; calcining to remove water and/or carbon dioxide; roasting, autoclaving, and/or chlorination in preparation for leaching (except where the roasting (and/or autoclaving and/or chlorination)/leaching sequence produces a final or intermediate product that does not undergo further beneficiation or processing); gravity concentration; magnetic separation; electrostatic separation; flotation; ion exchange; solvent extraction; electrowinning; precipitation; amalgamation; and heap, dump, vat, tank, and in situ leaching.

(ii) For the purposes of § 261.4(b)(7), solid waste from the processing of ores and minerals includes only the following wastes as generated:

(A) Slag from primary copper processing;

(B) Slag from primary lead processing;

(C) Red and brown muds from bauxite refining;

(D) Phosphogypsum from phosphoric acid production;

(E) Slag from elemental phosphorus production;

(F) Gasifier ash from coal gasification;

(G) Process wastewater from coal gasification;

(H) Calcium sulfate wastewater treatment plant sludge from primary copper processing;

(I) Slag tailings from primary copper processing;

(J) Fluorogypsum from hydrofluoric acid production;

(K) Process wastewater from hydrofluoric acid production;

(L) Air pollution control dust/sludge from iron blast furnaces;

(M) Iron blast furnace slag;

(N) Treated residue from roasting/leaching of chrome ore;

(O) Process wastewater from primary magnesium processing by the anhydrous process;

(P) Process wastewater from phosphoric acid production;

(Q) Basic oxygen furnace and open hearth furnace air pollution control dust/sludge from carbon steel production;

(R) Basic oxygen furnace and open hearth furnace slag from carbon steel production;

(S) Chloride process waste solids from titanium tetrachloride production;

(T) Slag from primary zinc processing.

(iii) A residue derived from co-processing mineral processing secondary materials with normal beneficiation raw materials remains excluded under paragraph (b) of this section if the owner or operator:

(A) Processes at least 50 percent by weight normal beneficiation raw materials; and,

(B) Legitimately reclaims the secondary mineral processing materials.

* * * * *

PART 268—LAND DISPOSAL RESTRICTIONS

7. The authority citation for Part 268 continues to read as follows:

Authority: 42 U.S.C. 6905, 6912(a), 6921, and 6924.

8. Section 268.2 is amended by revising paragraph (i) and adding paragraph (k) to read as follows:

§ 268.2 Definitions applicable in this part.

* * * * *

(i) Underlying hazardous constituent means any constituent listed in § 268.48, Table UTS—Universal Treatment Standards, except fluoride, selenium, sulfides, vanadium, and zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standards.

* * * * *

(k) Soil means unconsolidated earth material composing the superficial geologic strata (material overlying bedrock), consisting of clay, silt, sand, or gravel size particles as classified by the U.S. Soil Conservation Service, or a mixture of such materials with liquids, sludges or solids which is inseparable by simple mechanical removal processes and is made up primarily of soil by volume based on visual inspection.

9. Section 268.3 is amended by adding paragraph (d) to read as follows:

§ 268.3 Dilution prohibited as a substitute for treatment.

* * * * *

(d) It is a form of impermissible dilution, and therefore prohibited, to add iron filings or other metallic forms of iron to lead-containing hazardous wastes in order to achieve any land disposal restriction treatment standard for lead. Lead-containing wastes include D008 wastes (wastes exhibiting a characteristic due to the presence of lead), all characteristic wastes containing lead as an underlying hazardous constituent, listed wastes containing lead as a regulated constitutent, and hazardous media containing any of the aforementioned lead-containing wastes.

10. Section 268.4 is amended by revising paragraphs (a)(2)(ii) and (a)(2)(iii) to read as follows:

§ 268.4 Treatment surface impoundment exemption.

(a) * * *

(2) * * *

(ii) Removal. The following treatment residues (including any liquid waste) must be removed at least annually; residues which do not meet the treatment standards promulgated under subpart D of this part; residues which do not meet the prohibition levels established under subpart C of this part or imposed by statute (where no treatment standards have been established); residues which are from the treatment of wastes prohibited from land disposal under subpart C of this part (where no treatment standards have been established and no prohibition levels apply); or residues from managing listed wastes which are not delisted under § 260.22 of this chapter. If the volume of liquid flowing through the impoundment or series of impoundments annually is greater than the volume of the impoundment or impoundments, this flow-through constitutes removal of the supernatant for the purpose of this requirement.

(iii) Subsequent management. Treatment residues may not be placed in any other surface impoundment for subsequent management.

* * * * *

11. Section 268.7 is amended by revising paragraphs (a)(1), (a)(3)(ii), (a)(7), (b)(1), (b)(2), (b)(5) and (b)(6); by revising the first sentence of the paragraphs (a)(2), (a)(3) introductory text, (a)(4), (a)(5) introductory text, (a)(6), and (b)(3) introductory text; by adding paragraph (a)(2)(i) and three sentences to the end of paragraph (b)(4) introductory text and adding paragraphs (b)(4)(iv), (b)(4)(v), and (e) and adding and reserving paragraph (a)(2)(ii); and by revising entries 1 and 3, designating entry 8 as 9, and adding entry 8 in the table entitled ‘‘Generator Paperwork Requirements Table’’ in paragraph (a)(4), and by revising entries 1 and 2 designating entry 5 as 6, and adding entry 5 in the table entitled ‘‘Treatment Facility Paperwork Requirements Table’’ in paragraph (b)(3)(ii) to read as follows:

§ 268.7 Testing, tracking, and recordkeeping requirements for generators, treaters, and disposal facilities.

(a) * * *

(1) A generator of hazardous waste must determine if the waste has to be treated before it can be land disposed. This is done by determining if the hazardous waste meets the treatment standards in § 268.40, § 268.45, or § 268.49. This determination can be made in either of two ways: testing the waste or using knowledge of the waste. If the generator tests the waste, testing would normally determine the total concentration of hazardous constituents, or the concentration of hazardous constituents in an extract of the waste obtained using test method 1311 in ‘‘Test Methods of Evaluating Solid Waste, Physical/Chemical Methods,’’ EPA Publication SW–846, as referenced in § 260.11 of this chapter, depending on whether the treatment standard for the waste is expressed as a total concentration or concentration of hazardous constituent in the waste’s extract. In addition, some hazardous wastes must be treated by particular treatment methods before they can be land disposed and some soils are contaminated by such hazardous wastes. These treatment standards are also found in § 268.40, and are described in detail in § 268.42, Table 1. These wastes, and soils contaminated with such wastes, do not need to be tested (however, if they are in a waste mixture, other wastes with concentration level treatment standards would have to be tested). If a generator determines they are managing a waste or soil contaminated with a waste, that displays a hazardous characteristic of ignitability, corrosivity, reactivity, or toxicity, they must comply with the special requirements of § 268.9 of this part in addition to any applicable requirements in this section.

(2) If the waste or contaminated soil does not meet the treatment standard: With the initial shipment of waste to each treatment or storage facility, the generator must send a one-time written notice to each treatment or storage facility receiving the waste, and place a copy in the file. * * *

(i) For contaminated soil, the following certification statement should be included, signed by an authorized representative:

I certify under penalty of law that I personally have examined this contaminated soil and it [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and requires treatment to meet the soil treatment standards as provided by 268.49(c).

(ii) [Reserved]

(3) If the waste or contaminated soil meets the treatment standard at the original point of generation:

* * * * *

(ii) For contaminated soil, with the initial shipment of wastes to each treatment, storage, or disposal facility, the generator must send a one-time written notice to each facility receiving the waste and place a copy in the file. The notice must include the information in ‘‘268.7(a)(3) of the Generator Paperwork Requirements Table in § 268.7(a)(4).

(4) For reporting, tracking, and recordkeeping when exceptions allow certain wastes or contaminated soil that

do not meet the treatment standards to be land disposed: There are certain exemptions from the requirement that hazardous wastes or contaminated soil meet treatment standards before they can be land disposed. * * *

* * * * *

GENERATOR PAPERWORK REQUIREMENTS TABLE

Required information	§ 268.7 (a)(2)	§ 268.7 (a)(3)	§ 268.7 (a)(4)	§ 268.7 (a)(9)
1. EPA Hazardous Waste Numbers and Manifest Number of first shipment.				
* * * * * * *				
3. The waste is subject to the LDRs. The constituents of concern for F001–F005, and F039, and underlying hazardous constituents in characteristic wastes, unless the waste will be treated and monitored for all constituents. If all constituents will be treated and monitored, there is no need to put them all on the LDR notice	✔	....	....	....
* * * * * * *				
8. For contaminated soil subject to LDRs as provided in 268.49(a), the constituents subject to treatment as described in 268.49(d), and the following statement: This contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit a characteristic of hazardous waste and [is subject to/complies with’ the soil treatment standards as provided by 268.49(c) or the universal treatment standards.	✔	....	....	....
* * * * * * *				

(5) If a generator is managing and treating prohibited waste or contaminated soil in tanks, containers, or containment buildings regulated under 40 CFR 262.34 to meet applicable LDR treatment standards found at § 268.40, the generator must develop and follow a written waste analysis plan which describes the procedures they will carry out to comply with the treatment standards. * * *

* * * * *

(6) If a generator determines that the waste or contaminated soil is restricted based solely on his knowledge of the waste, all supporting data used to make this determination must be retained on-site in the generator's files. * * *

(7) If a generator determines that he is managing a prohibited waste that is excluded from the definition of hazardous or solid waste or is exempted from Subtitle C regulation under 40 CFR 261.2 through 261.6 subsequent to the point of generation (including deactivated characteristic hazardous wastes managed in wastewater treatment systems subject to the Clean Water Act (CWA) as specified at 40 CFR 261.4(a)(2) or that are CWA-equivalent, or are managed in an underground injection well regulated by the SDWA), he must place a one-time notice describing such generation, subsequent exclusion from the definition of hazardous or solid waste or exemption from RCRA Subtitle C regulation, and the disposition of the waste, in the facility's on-site files.

* * * * *

(b) * * *

(1) For wastes or contaminated soil with treatment standards expressed in the waste extract (TCLP), the owner or operator of the treatment facility must test an extract of the treatment residues, using test method 1311 (the Toxicity Characteristic Leaching Procedure, described in ‘‘Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,’’ EPA Publication SW–846 as incorporated by reference in § 260.11 of this chapter) to assure that the treatment residues extract meet the applicable treatment standards.

(2) For wastes or contaminated soil with treatment standards expressed as concentrations in the waste, the owner or operator of the treatment facility must test the treatment residues (not an extract of such residues) to assure that they meet the applicable treatment standards.

(3) A one-time notice must be sent with the initial shipment of waste or contaminated soil to the land disposal facility. * * *

* * * * *

(ii) * * *

TREATMENT FACILITY PAPERWORK REQUIREMENTS TABLE

Required information	§ 268.7(b)
1. EPA Hazardous Waste Numbers and Manifest Number of first shipment.	
2. The waste is subject to the LDRs. The constituents of concern for F001–F005, and F039, and underlying hazardous constituents in characteristic wastes, unless the waste will be treated and monitored for all constituents. If all constituents will be treated and monitored, there is no need to put them all on the LDR notice.	✔
* * * * * * *	
5. For contaminated soil subject to LDRs as provided in 268.49(a), the constituents subject to treatment as described in 268.49(d) and the following statement, ‘‘this contaminated soil [does/does not] contain listed hazardous waste and [does/does not] exhibit acharacteristic of hazardous waste and [is subject to/complies with] the soil treatment standards as provided by 268.49(c).	✔
* * * * * * *	

(4) * * * A certification is also necessary for contaminated soil and it must state:

> I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to

comply with treatment standards specified in 40 CFR 268.49 without impermissible dilution of the prohibited wastes. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

* * * * *

(iv) For characteristic wastes that are subject to the treatment standards in § 268.40 (other than those expressed as a required method of treatment) that are reasonably expected to contain underlying hazardous constituents as defined in § 268.2(i); are treated on-site to remove the hazardous characteristic; and are then sent off-site for treatment of underlying hazardous constituents, the certification must state the following:

> I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic. This decharacterized waste contains underlying hazardous constituents that require further treatment to meet universal treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

(v) For characteristic wastes that contain underlying hazardous constituents as defined § 268.2(i) that are treated on-site to remove the hazardous characteristic to treat underlying hazardous constituents to levels in § 268.48 Universal Treatment Standards, the certification must state the following:

> I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 to remove the hazardous characteristic and that underlying hazardous constituents, as defined in § 268.2(i) have been treated on-site to meet the § 268.48 Universal Treatment Standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment.

(5) If the waste or treatment residue will be further managed at a different treatment, storage, or disposal facility, the treatment, storage, or disposal facility sending the waste or treatment residue off-site must comply with the notice and certification requirements applicable to generators under this section.

(6) Where the wastes are recyclable materials used in a manner constituting disposal subject to the provisions of § 268.20(b) regarding treatment standards and prohibition levels, the owner or operator of a treatment facility (i.e., the recycler) is not required to notify the receiving facility, pursuant to paragraph (b)(3) of this section. With each shipment of such wastes the owner or operator of the recycling facility must submit a certification described in paragraph (b)(4) of this section, and a notice which includes the information listed in paragraph (b)(3) of this section (except the manifest number) to the Regional Administrator, or his delegated representative. The recycling facility also must keep records of the name and location of each entity receiving the hazardous waste-derived product.

* * * * *

(e) Generators and treaters who first receive from EPA or an authorized state a determination that a given contaminated soil subject to LDRs as provided in § 268.49(a) no longer contains a listed hazardous waste and generators and treaters who first determine that a contaminated soil subject to LDRs as provided in § 268.49(a) no longer exhibits a characteristic of hazardous waste must:

(1) Prepare a one-time only documentation of these determinations including all supporting information; and,

(2) Maintain that information in the facility files and other records for a minimum of three years.

Subpart C—Prohibitions on Land Disposal

12. Section § 268.34 is revised to read as follows:

§ 268.34 Waste specific prohibitions—toxicity characteristic metal wastes.

(a) Effective August 24, 1998, the following wastes are prohibited from land disposal: the wastes specified in 40 CFR Part 261 as EPA Hazardous Waste numbers D004—D011 that are newly identified (i.e. wastes, soil, or debris identified as hazardous by the Toxic Characteristic Leaching Procedure but not the Extraction Procedure), and waste, soil, or debris from mineral processing operations that is identified as hazardous by the specifications at 40 CFR Part 261.

(b) Effective May 26, 2000, the following wastes are prohibited from land disposal: newly identified characteristic wastes from elemental phosphorus processing; radioactive wastes mixed with EPA Hazardous wastes D004—D011 that are newly identified (i.e. wastes, soil, or debris identified as hazardous by the Toxic Characteristic Leaching Procedure but not the Extraction Procedure); or mixed with newly identified characteristic mineral processing wastes, soil, or debris.

(c) Between May 26, 1998 and May 26, 2000, newly identified characteristic wastes from elemental phosphorus processing, radioactive waste mixed with D004—D011 wastes that are newly identified (i.e. wastes, soil, or debris identified as hazardous by the Toxic Characteristic Leaching Procedure but not the Extraction Procedure), or mixed with newly identified characteristic mineral processing wastes, soil, or debris may be disposed in a landfill or surface impoundment only if such unit is in compliance with the requirements specified in § 268.5(h)(2) of this part.

(d) The requirements of paragraphs (a) and (b) of this section do not apply if:

(1) The wastes meet the applicable treatment standards specified in subpart D of this part;

(2) Persons have been granted an exemption from a prohibition pursuant to a petition under § 268.6, with respect to those wastes and units covered by the petition;

(3) The wastes meet the applicable alternate treatment standards established pursuant to a petition granted under § 268.44; or

(4) Persons have been granted an extension to the effective date of a prohibition pursuant to § 268.5, with respect to these wastes covered by the extension.

(e) To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards specified in § 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentrations in the waste extract or the waste, or the generator may use knowledge of the waste. If the waste contains constituents (including underlying hazardous constituents in characteristic wastes) in excess of the applicable Universal Treatment Standard levels of § 268.48 of this part, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.

Subpart D—Treatment Standards

13. Section 268.40 is amended by revising paragraph (e), adding paragraph (h), and revising the Table of Treatment Standards to read as follows:

§ 268.40 Applicability of treatment standards.

* * * * *

(e) For characteristic wastes (D001—D043) that are subject to treatment standards in the following table ‘‘Treatment Standards for Hazardous Wastes,’’ and are not managed in a wastewater treatment system that is regulated under the Clean Water Act (CWA), that is CWA-equivalent, or that is injected into a Class I nonhazardous deep injection well, all underlying hazardous constituents (as defined in § 268.2(i)) must meet Universal Treatment Standards, found in § 268.48, Table Universal Treatment Standards, prior to land disposal as defined in § 268.2(c) of this part.

* * * * *

(h) Prohibited D004–D011 mixed radioactive wastes and mixed radioactive listed wastes containing metal constituents, that were previously treated by stabilization to the treatment standards in effect at that time and then put into storage, do not have to be re-treated to meet treatment standards in this section prior to land disposal.

BILLING CODE 6560–50–P

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D001 [9]	Ignitable Characteristic Wastes, except for the §261.21(a)(1) High TOC Subcategory.	NA	NA	DEACT and meet §268.48 standards[8]; or RORGS; or CMBST	DEACT and meet §268.48 standards[8]; or RORGS; or CMBST
	High TOC Ignitable Characteristic Liquids Subcategory based on 40 CFR 261.21(a)(1) - Greater than or equal to 10% total organic carbon. (Note: This subcategory consists of nonwastewaters only.)	NA	NA	NA	RORGS; CMBST; or POLYM
D002 [9]	Corrosive Characteristic Wastes.	NA	NA	DEACT and meet §268.48 standards[8]	DEACT and meet §268.48 standards[8]
D002, D004, D005, D006, D007, D008, D009, D010, D011	Radioactive high level wastes generated during the reprocessing of fuel rods. (Note: This subcategory consists of nonwastewaters only.)	Corrosivity (pH)	NA	NA	HLVIT
		Arsenic	7440-38-2	NA	HLVIT
		Barium	7440-39-3	NA	HLVIT
		Cadmium	7440-43-9	NA	HLVIT
		Chromium (Total)	7440-47-3	NA	HLVIT
		Lead	7439-92-1	NA	HLVIT
		Mercury	7439-97-6	NA	HLVIT
		Selenium	7782-49-2	NA	HLVIT
		Silver	7440-22-4	NA	HLVIT
D003 [9]	Reactive Sulfides Subcategory based on 261.23(a)(5).	NA	NA	DEACT	DEACT
	Explosives Subcategory based on 261.23(a)(6), (7), and (8).	NA	NA	DEACT and meet §268.48 standards[8]	DEACT and meet §268.48 standards[8]

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	Unexploded ordnance and other explosive devices which have been the subject of an emergency response.	NA	NA	DEACT	DEACT
	Other Reactives Subcategory based on 261.23(a)(1).	NA	NA	DEACT and meet §268.48 standards[8]	DEACT and meet §268.48 standards[8]
	Water Reactive Subcategory based on 261.23(a)(2), (3), and (4). (Note: This subcategory consists of nonwastewaters only.)	NA	NA	NA	DEACT and meet §268.48 standards[8]
	Reactive Cyanides Subcategory based on 261.23(a)(5).	Cyanides (Total)[7]	57-12-5	Reserved	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
D004 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for arsenic based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Arsenic	7440-38-2	1.4 and meet §268.48 standards[8]	5.0 mg/l TCLP and meet §268.48 standards[8]
D005 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for barium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Barium	7440-39-3	1.2 and meet §268.48 standards[8]	21 mg/l TCLP and meet §268.48 standards[8]
D006 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for cadmium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Cadmium	7440-43-9	0.69 and meet §268.48 standards[8]	0.11 mg/l TCLP and meet §268.48 standards[8]
	Cadmium Containing Batteries Subcategory. (Note: This subcategory consists of nonwastewaters only.)	Cadmium	7440-43-9	NA	RTHRM

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D007 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for chromium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Chromium (Total)	7440-47-3	2.77 and meet §268.48 standards[8]	0.60 mg/l TCLP and meet §268.48 standards[8]
D008 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for lead based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Lead	7439-92-1	0.69 and meet §268.48 standards[8]	0.75 mg/l TCLP and meet §268.48 standards[8]
	Lead Acid Batteries Subcategory (Note: This standard only applies to lead acid batteries that are identified as RCRA hazardous wastes and that are not excluded elsewhere from regulation under the land disposal restrictions of 40 CFR 268 or exempted under other EPA regulations (see 40 CFR 266.80). This subcategory consists of nonwastewaters only.)	Lead	7439-92-1	NA	RLEAD
	Radioactive Lead Solids Subcategory (Note: these lead solids include, but are not limited to, all forms of lead shielding and other elemental forms of lead. These lead solids do not include treatment residuals such as hydroxide sludges, other wastewater treatment residuals, or incinerator ashes that can undergo conventional pozzolanic stabilization, nor do they include organo-lead materials that can be incinerated and stabilized as ash. This subcategory consists of nonwastewaters only.)	Lead	7439-92-1	NA	MACRO
D009 [9]	Nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain greater than or equal to 260 mg/kg total mercury that also contain organics and are not incinerator residues. (High Mercury-Organic Subcategory)	Mercury	7439-97-6	NA	IMERC; OR RMERC

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
	Nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain greater than or equal to 260 mg/kg total mercury that are inorganic, including incinerator residues and residues from RMERC. (High Mercury-Inorganic Subcategory)	Mercury	7439-97-6	NA	RMERC
	Nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain less than 260 mg/kg total mercury and that are residues from RMERC only. (Low Mercury Subcategory)	Mercury	7439-97-6	NA	0.20 mg/l TCLP and meet §268.48 standards[8]
	All other nonwastewaters that exhibit, or are expected to exhibit, the characteristic of toxicity for mercury based on the toxicity characteristic leaching procedure (TCLP) in SW846; and contain less than 260 mg/kg total mercury and that are not residues from RMERC. (Low Mercury Subcategory)	Mercury	7439-97-6	NA	0.025 mg/l TCLP and meet §268.48 standards[8]
	All D009 wastewaters.	Mercury	7439-97-6	0.15 and meet §268.48 standards[8]	NA
	Elemental mercury contaminated with radioactive materials. (Note: This subcategory consists of nonwastewaters only.)	Mercury	7439-97-6	NA	AMLGM
	Hydraulic oil contaminated with Mercury Radioactive Materials Subcategory. (Note: This subcategory consists of nonwastewaters only.)	Mercury	7439-97-6	NA	IMERC

TREATMENT STANDARDS FOR HAZARDOUS WASTES NOTE: NA means not applicable

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D010 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for selenium based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Selenium	7782-49-2	0.82 and meet §268.48 standards[8]	5.7 mg/l TCLP and meet §268.48 standards[8]
D011 [9]	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for silver based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Silver	7440-22-4	0.43 and meet §268.48 standards[8]	0.14 mg/l TCLP and meet §268.48 standards[8]
D012 [9]	Wastes that are TC for Endrin based on the TCLP in SW846 Method 1311.	Endrin	72-20-8	BIODG; or CMBST	0.13 and meet §268.48 standards[8]
		Endrin aldehyde	7421-93-4	BIODG; or CMBST	0.13 and meet §268.48 standards[8]
D013 [9]	Wastes that are TC for Lindane based on the TCLP in SW846 Method 1311.	alpha-BHC	319-84-6	CARBN; or CMBST	0.066 and meet §268.48 standards[8]
		beta-BHC	319-85-7	CARBN; or CMBST	0.066 and meet §268.48 standards[8]
		delta-BHC	319-86-8	CARBN; or CMBST	0.066 and meet §268.48 standards[8]
		gamma-BHC (Lindane)	58-89-9	CARBN; or CMBST	0.066 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D014[9]	Wastes that are TC for Methoxychlor based on the TCLP in SW846 Method 1311.	Methoxychlor	72-43-5	WETOX or CMBST	0.18 and meet §268.48 standards[8]
D015[9]	Wastes that are TC for Toxaphene based on the TCLP in SW846 Method 1311.	Toxaphene	8001-35-2	BIODG or CMBST	2.6 and meet §268.48 standards[8]
D016[9]	Wastes that are TC for 2,4-D (2,4-Dichlorophenoxyacetic acid) based on the TCLP in SW846 Method 1311.	2,4-D (2,4-Dichlorophenoxyacetic acid)	94-75-7	CHOXD, BIODG, or CMBST	10 and meet §268.48 standards[8]
D017[9]	Wastes that are TC for 2,4,5-TP (Silvex) based on the TCLP in SW846 Method 1311.	2,4,5-TP (Silvex)	93-72-1	CHOXD or CMBST	7.9 and meet §268.48 standards[8]
D018[9]	Wastes that are TC for Benzene based on the TCLP in SW846 Method 1311.	Benzene	71-43-2	0.14 and meet §268.48 standards[8]	10 and meet §268.48 standards[8]
D019[9]	Wastes that are TC for Carbon tetrachloride based on the TCLP in SW846 Method 1311.	Carbon tetrachloride	56-23-5	0.057 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D020[9]	Wastes that are TC for Chlordane based on the TCLP in SW846 Method 1311.	Chlordane (alpha and gamma isomers)	57-74-9	0.0033 and meet §268.48 standards[8]	0.26 and meet §268.48 standards[8]
D021[9]	Wastes that are TC for Chlorobenzene based on the TCLP in SW846 Method 1311.	Chlorobenzene	108-90-7	0.057 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D022[9]	Wastes that are TC for Chloroform based on the TCLP in SW846 Method 1311.	Chloroform	67-66-3	0.046 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D023 [9]	Wastes that are TC for o-Cresol based on the TCLP in SW846 Method 1311.	o-Cresol	95-48-7	0.11 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D024 [9]	Wastes that are TC for m-Cresol based on the TCLP in SW846 Method 1311.	m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D025 [9]	Wastes that are TC for p-Cresol based on the TCLP in SW846 Method 1311.	p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D026 [9]	Wastes that are TC for Cresols (Total) based on the TCLP in SW846 Method 1311.	Cresol-mixed isomers (Cresylic acid)(sum of o-, m-, and p-cresol concentrations)	1319-77-3	0.88 and meet §268.48 standards[8]	11.2 and meet §268.48 standards[8]
D027 [9]	Wastes that are TC for p-Dichlorobenzene based on the TCLP in SW846 Method 1311.	p-Dichlorobenzene (1,4-Dichlorobenzene)	106-46-7	0.090 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D028 [9]	Wastes that are TC for 1,2-Dichloroethane based on the TCLP in SW846 Method 1311.	1,2-Dichloroethane	107-06-2	0.21 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D029 [9]	Wastes that are TC for 1,1-Dichloroethylene based on the TCLP in SW846 Method 1311.	1,1-Dichloroethylene	75-35-4	0.025 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D030 [9]	Wastes that are TC for 2,4-Dinitrotoluene based on the TCLP in SW846 Method 1311.	2,4-Dinitrotoluene	121-14-2	0.32 and meet §268.48 standards[8]	140 and meet §268.48 standards[8]
D031 [9]	Wastes that are TC for Heptachlor based on the TCLP in SW846 Method 1311.	Heptachlor	76-44-8	0.0012 and meet §268.48 standards[8]	0.066 and meet §268.48 standards[8]

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WASTE CODE	**WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY**[1]	**REGULATED HAZARDOUS CONSTITUENT**		**WASTEWATERS**	**NONWASTEWATERS**
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Heptachlor epoxide	1024-57-3	0.016 and meet §268.48 standards[8]	0.066 and meet §268.48 standards[8]
D032 [9]	Wastes that are TC for Hexachlorobenzene based on the TCLP in SW846 Method 1311.	Hexachlorobenzene	118-74-1	0.055 and meet §268.48 standards[8]	10 and meet §268.48 standards[8]
D033 [9]	Wastes that are TC for Hexachlorobutadiene based on the TCLP in SW846 Method 1311.	Hexachlorobutadiene	87-68-3	0.055 and meet §268.48 standards[8]	5.6 and meet §268.48 standards[8]
D034 [9]	Wastes that are TC for Hexachloroethane based on the TCLP in SW846 Method 1311.	Hexachloroethane	67-72-1	0.055 and meet §268.48 standards[8]	30 and meet §268.48 standards[8]
D035 [9]	Wastes that are TC for Methyl ethyl ketone based on the TCLP in SW846 Method 1311.	Methyl ethyl ketone	78-93-3	0.28 and meet §268.48 standards[8]	36 and meet §268.48 standards[8]
D036 [9]	Wastes that are TC for Nitrobenzene based on the TCLP in SW846 Method 1311.	Nitrobenzene	98-95-3	0.068 and meet §268.48 standards[8]	14 and meet §268.48 standards[8]
D037 [9]	Wastes that are TC for Pentachlorophenol based on the TCLP in SW846 Method 1311.	Pentachlorophenol	87-86-5	0.089 and meet §268.48 standards[8]	7.4 and meet §268.48 standards[8]
D038 [9]	Wastes that are TC for Pyridine based on the TCLP in SW846 Method 1311.	Pyridine	110-86-1	0.014 and meet §268.48 standards[8]	16 and meet §268.48 standards[8]

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
D039 [9]	Wastes that are TC for Tetrachloroethylene based on the TCLP in SW846 Method 1311.	Tetrachloroethylene	127-18-4	0.056 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D040 [9]	Wastes that are TC for Trichloroethylene based on the TCLP in SW846 Method 1311.	Trichloroethylene	79-01-6	0.054 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]
D041 [9]	Wastes that are TC for 2,4,5-Trichlorophenol based on the TCLP in SW846 Method 1311.	2,4,5-Trichlorophenol	95-95-4	0.18 and meet §268.48 standards[8]	7.4 and meet §268.48 standards[8]
D042 [9]	Wastes that are TC for 2,4,6-Trichlorophenol based on the TCLP in SW846 Method 1311.	2,4,6-Trichlorophenol	88-06-2	0.035 and meet §268.48 standards[8]	7.4 and meet §268.48 standards[8]
D043 [9]	Wastes that are TC for Vinyl chloride based on the TCLP in SW846 Method 1311.	Vinyl chloride	75-01-4	0.27 and meet §268.48 standards[8]	6.0 and meet §268.48 standards[8]

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F001, F002, F003, F004, & F005	F001, F002, F003, F004 and/or F005 solvent wastes that contain any combination of one or more of the following spent solvents: acetone, benzene, n-butyl alcohol, carbon disulfide, carbon tetrachloride, chlorinated fluorocarbons, chlorobenzene, o-cresol, m-cresol, p-cresol, cyclohexanone, o-dichlorobenzene, 2-ethoxyethanol, ethyl acetate, ethyl benzene, ethyl ether, isobutyl alcohol, methanol, methylene chloride, methyl ethyl ketone, methyl isobutyl ketone, nitrobenzene, 2-nitropropane, pyridine, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloro-1,2,2-trifluoroethane, trichloroethylene, trichloromonofluoromethane, and/or xylenes [except as specifically noted in other subcategories]. See further details of these listings in § 261.31	Acetone	67-64-1	0.28	160
		Benzene	71-43-2	0.14	10
		n-Butyl alcohol	71-36-3	5.6	2.6
		Carbon disulfide	75-15-0	3.8	NA
		Carbon tetrachloride	56-23-5	0.057	6.0
		Chlorobenzene	108-90-7	0.057	6.0
		o-Cresol	95-48-7	0.11	5.6
		m-Cresol (difficult to distinguish from p-cresol)	108-39-4	0.77	5.6
		p-Cresol (difficult to distinguish from m-cresol)	106-44-5	0.77	5.6
		Cresol-mixed isomers (Cresylic acid) (sum of o-, m-, and p-cresol concentrations)	1319-77-3	0.88	11.2
		Cyclohexanone	108-94-1	0.36	NA
		o-Dichlorobenzene	95-50-1	0.088	6.0
		Ethyl acetate	141-78-6	0.34	33
		Ethyl benzene	100-41-4	0.057	10
		Ethyl ether	60-29-7	0.12	160
		Isobutyl alcohol	78-83-1	5.6	170
		Methanol	67-56-1	5.6	NA

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		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
		Methylene chloride	75-9-2	0.089	30
		Methyl ethyl ketone	78-93-3	0.28	36
		Methyl isobutyl ketone	108-10-1	0.14	33
		Nitrobenzene	98-95-3	0.068	14
		Pyridine	110-86-1	0.014	16
		Tetrachloroethylene	127-18-4	0.056	6.0
		Toluene	108-88-3	0.080	10
		1,1,1-Trichloroethane	71-55-6	0.054	6.0
		1,1,2-Trichloroethane	79-00-5	0.054	6.0
		1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	0.057	30
		Trichloroethylene	79-01-6	0.054	6.0
		Trichloromonofluoromethane	75-69-4	0.020	30
		Xylenes-mixed isomers (sum of o-, m-, and p-xylene concentrations)	1330-20-7	0.32	30
	F003 and/or F005 solvent wastes that contain any combination of one or more of the following three solvents as the only listed F001-5 solvents: carbon disulfide, cyclohexanone, and/or methanol. (formerly 268.41(c))	Carbon disulfide	75-15-0	3.8	4.8 mg/l TCLP
		Cyclohexanone	108-94-1	0.36	0.75 mg/l TCLP
		Methanol	67-56-1	5.6	0.75 mg/l TCLP
	F005 solvent waste containing 2-Nitropropane as the only listed F001-5 solvent.	2-Nitropropane	79-46-9	(WETOX or CHOXD) fb CARBN; or CMBST	CMBST
	F005 solvent waste containing 2-Ethoxyethanol as the only listed F001-5 solvent.	2-Ethoxyethanol	110-80-5	BIODG: or CMBST	CMBST

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WASTE CODE	WASTE DESCRIPTION AND TREATMENT/REGULATORY SUBCATEGORY[1]	REGULATED HAZARDOUS CONSTITUENT		WASTEWATERS	NONWASTEWATERS
		Common Name	CAS[2] Number	Concentration in mg/l[3]; or Technology Code[4]	Concentration in mg/kg[5] unless noted as "mg/l TCLP"; or Technology Code[4]
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum.	Cadmium	7440-43-9	0.69	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F007	Spent cyanide plating bath solutions from electroplating operations.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.	Cadmium	7440-43-9	NA	0.11 mg/l TCLP
		Chromium (Total)	7440-47-3	2.77	0.60 mg/l TCLP
		Cyanides (Total)[7]	57-12-5	1.2	590
		Cyanides (Amenable)[7]	57-12-5	0.86	30
		Lead	7439-92-1	0.69	0.75 mg/l TCLP
		Nickel	7440-02-0	3.98	11 mg/l TCLP
		Silver	7440-22-4	NA	0.14 mg/l TCLP