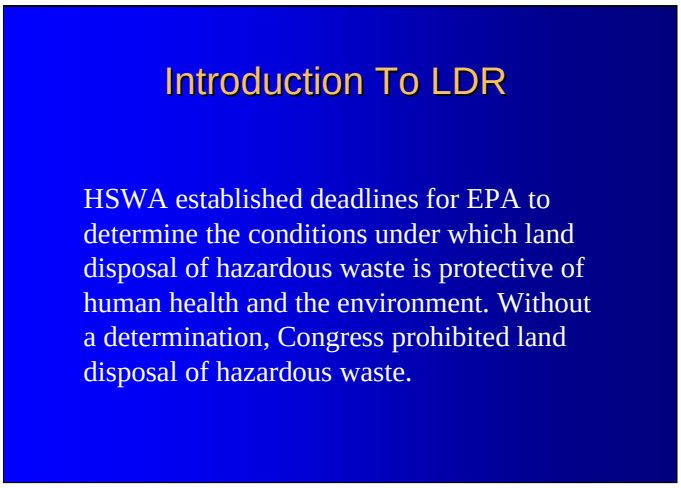
The land disposal restrictions, which prohibit hazardous wastes from being placed into or onto the land without first being treated, are the most dynamic of all Subtitle C provisions and continue to play an integral role in the regulated community's movement toward waste minimization and innovative technology development.

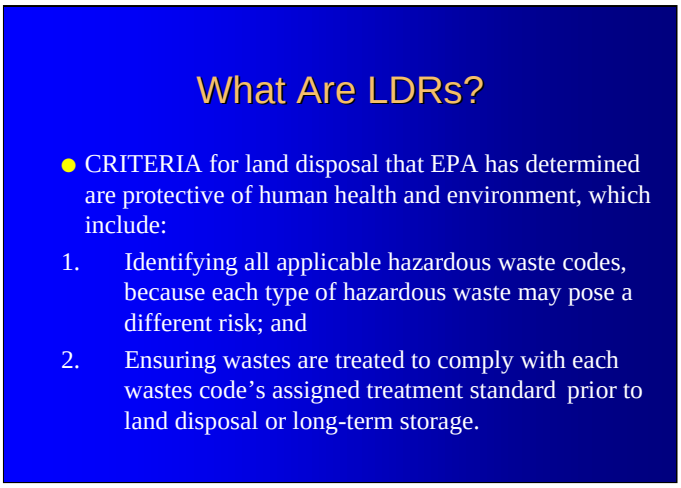
By the end of this module, participants should be able to:

- Define the term land disposal and restate its significance. (p. 3)
- CRITERION 1: Explain WHAT, WHEN, and HOW to determine all applicable hazardous waste codes (pp. 4 - 9)
  - Explain the approach EPA uses to establish LDR treatment standards. (p. 6)
  - Provide two regulatory citations for locating LDR treatment standards. (pp. 6-7)
  - Identify the point at which LDR provisions apply. (p. 8)
  - Explain LDR applicability to wastes that were considered hazardous on Nov. 8, 1984,versus "newly listed" wastes. (p. 10)
- CRITERION 2: Explain how TSDFs ensure wastes are treated to meet all applicable waste codes. (pp. 15-19)
  - Discuss the mechanism of and need for notifying off-site TSDFs. (pp. 16, 17)
  - Explain how a TSDF verifies and certifies compliance with the applicable treatment standard(s). (p. 18, 19)
  - Distinguish between compliance requirements for listed versus characteristic wastes once treated to meet treatment standards. (p. 20)
  - Discuss the dilution prohibition and its impact on LDR standards. (p. 21)
- State key time periods governing the LDR storage prohibition and some exemptions. (p.22)
- Explain key LDR recordkeeping requirements that demonstrate compliance with LDR criteria. (p. 23)
- List and briefly explain four variances and extensions from LDR. (p. 24-28)



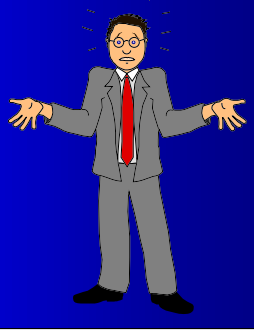
The Hazardous and Solid Waste Amendments of 1984 (HSWA), enacted on November 8, 1984, imposed substantial new responsibilities on persons handling hazardous waste. Among other responsibilities, HSWA prohibited the land disposal of untreated hazardous wastes beyond specified dates. The statute requires EPA to set "levels or methods of treatment . . . which substantially diminish the toxicity . . . or substantially reduce the likelihood of migration of hazardous constituents from the waste . . . ." Absent such treatment, HSWA prohibited land disposal of hazardous wastes and, thus, forced development of new technology.

Because LDR provisions impose requirements on land disposal, you may question the applicability of the LDR to treatment of wastes. The LDR provisions apply from the point of generation, through treatment, and to ultimate disposal of the treatment residue for most wastes. Therefore, facilities must comply with the LDR even if their intent is treatment or recycle. Treatment and recycling processes themselves produce residues, which ultimately must be land disposed.



Although the RCRA statute sets forth the framework prohibiting land disposal, LDR regulations with which DOE must comply appear in the 40 CFR part 268. These regulations establish procedures that must be followed by individuals to ensure and document compliance with the LDR criteria listed above.

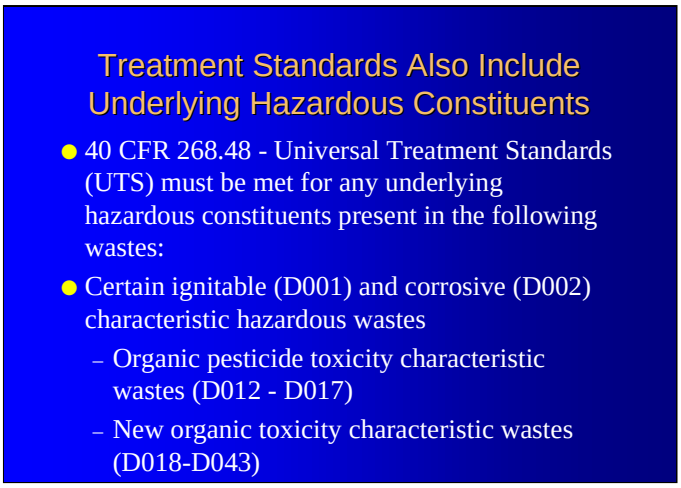
CRITERION 1: WHAT, WHEN, and HOW do I determine all applicable hazardous waste codes?



Because wastes are prohibited from land disposal, EPA requires they be treated to allow disposal or continued storage. The treatability of waste depends on the constituents in the waste and the waste form. To establish standards under LDR, EPA examined the BDAT for different treatability groups. Treatment standards found in 40 CFR 268 Subpart D are based on the use of BDAT and are designated as either constituent concentrations or specified technologies.

When applying BDAT, EPA considers waste codes (the designations in 40 CFR 261 Subparts C and D), treatment subcategories, and waste form (wastewater and nonwastewater). EPA defines a wastewater as a waste form with less than 1% total suspended solids (TSS) and less than 1% by weight total organic carbon (TOC). There are some exceptions to this definition of wastewater. The most important exception is that for spent solvents that are F001 - F005 waste codes, which must contain less than 1% by weight total organic carbon (TOC) or less than 1% of the regulated solvent constituents to be considered wastewaters.

Section 268.40, table "Treatment Standards for Hazardous Waste" contains the first set of BDAT-based treatment standards that must be considered by persons determining whether their waste is prohibited. Special considerations have been made for radioactively contaminated hazardous waste. For example, the waste code D008, lead waste, is further subdivided into treatment subcategories including wastes that exhibit (or are expected to exhibit) the characteristic of toxicity for lead, lead acid batteries, and ***radioactive lead solids.*** D009, mercury waste, is another example. This waste code has six subcategories: (1) high mercury-organic, (2) high mercury-inorganic, (3) low mercury, (4) all D009 wastewaters, (5) elemental mercury with radioactive materials, and (6) hydraulic oil contaminated with mercury radioactive materials. Each treatment subcategory and form (wastewater or nonwastewater) can have a different LDR standard that must be met prior to the land disposal of the treatment residue.



To comply with a September 25, 1992 decision of the U.S. Court of Appeals in *Chemical Waste Management v. EPA*, 976 F.2d 2 (D.C. Cir. 1992), EPA amended the treatment standards under LDR for certain wastes displaying the characteristics of ignitability (EPA Hazard Code D001) and corrosivity (EPA Hazard Code D002). Under the resulting interim final rule (May 24, 1993; 58 FR 29860), EPA required that those ignitable and corrosive wastes for which the treatment standard was deactivation and which are not managed in a CWA treatment system, a Class I injection wells regulated under the Safe Drinking Water Act, or a CWA-equivalent system meet treatment standards for the underlying hazardous constituents (UHCs) whenever those constituents are reasonably expected to be present at the point of generation in concentrations exceeding their respective universal treatment standard (UTS) levels. As with the hazardous waste determination, generators may base their determination of "reasonably expected to be present" on their knowledge of the raw materials used, the process, and potential reaction products, or the results of a one-time analysis for the entire list of UHCs.

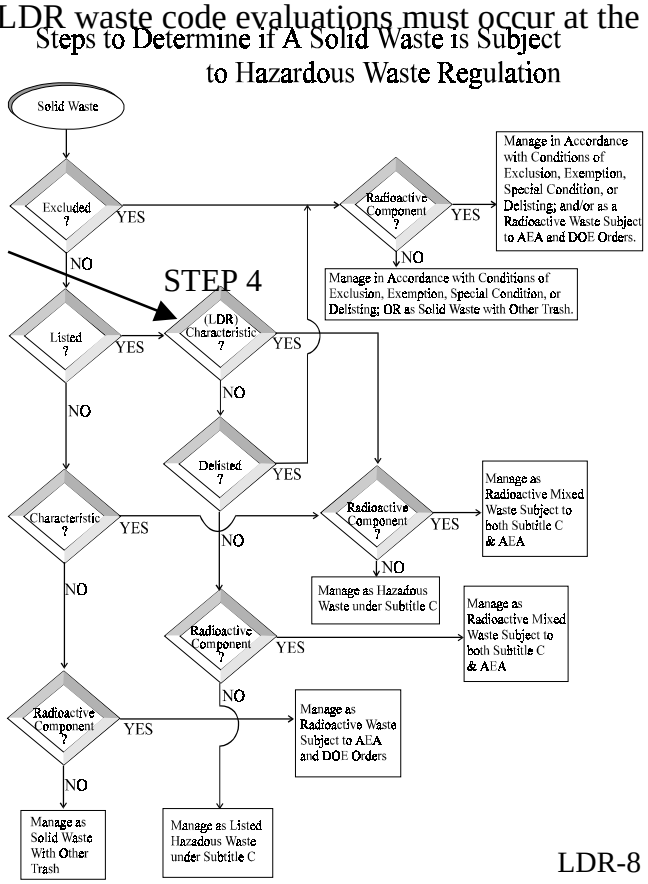
In a September 19, 1994 Federal Register notice, EPA expanded the application of this approach to include wastes that exhibit the characteristic of toxicity for pesticides and/or organics (59 FR 47980). For these wastes, the treatment standards found in 40 CFR 268.40, table "Treatment Standards for Hazardous Waste" apply to the individual constituent(s) responsible for the toxicity characteristic (TC) designation. In addition, a table presented in 40 CFR 268.48, Table UTS, contains a second set of treatment standards that must be considered when UHCs are reasonably expected to be present in TC waste. Note that EPA initially proposed to apply this concept to TC metal wastes (60 FR 43654), but reproposed treatment standards for certain TC metal wastes on May 12, 1997 (62 FR 26041).

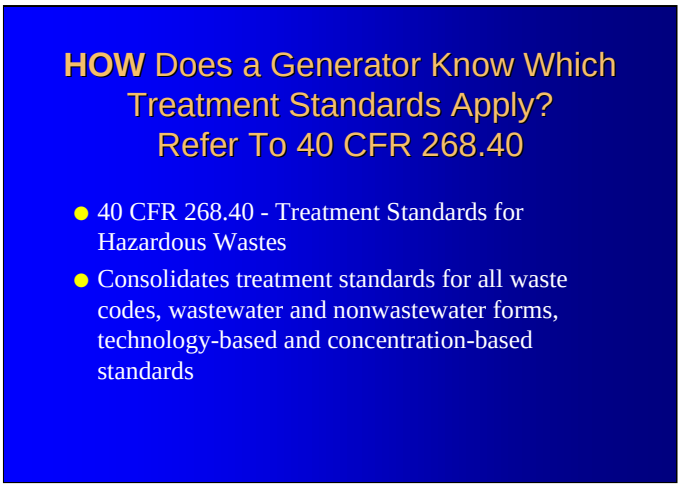
WHEN Must all Applicable Hazardous Waste Codes be Identified/Applied?

- From the initial point of generation through treatment and ultimate disposal (with a few exceptions)
- Whether the hazardous waste is being land disposed or not

Recall the hierarchy that is applied at a waste's initial point of generation to determine whether it qualifies as hazardous. Briefly, we determine whether the waste is excluded (Step 1), whether it meets a listing (Step 2), or whether it exhibits any characteristics (Step 3). Waste must qualify as hazardous before LDRs are even considered. Once deemed hazardous, however, generators must identify any and all applicable hazardous waste codes (including UHCs, when appropriate) and determine whether one or more of their waste codes has been assigned LDR treatment standards. If EPA has issued treatment standards, the waste is subject to LDR provisions. As with hazardous waste determinations, LDR waste code evaluations must occur at the waste's initial point of generation.

Waste Code Determinations Relative to Complying with LDR

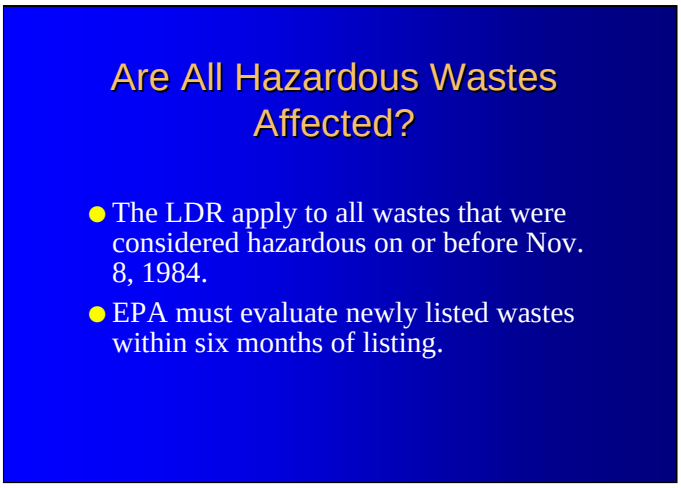




The consolidated table was created in modifications to the LDR program in the "Phase II" final rule, which was published September 19, 1994 (59 FR 47982). In this final rule, EPA attempted to simplify and provide consistency in LDR requirements by establishing a single set of requirements that apply to most hazardous wastes (i.e., universal standards for treatment).

In the past (and as may still the case in States that implement their own LDR program), generators and treaters had to review three different tables to determine whether the treatment standard concentration for a constituent in Waste A differed from the treatment standard for the same constituent in Waste B. The development of universal treatment standards allowed a revised approach in which generators and treaters look to a single consolidated table in 40 CFR 268.40. The treatment standard concentration for a constituent in Waste A will be the same as for that constituent in Waste B.

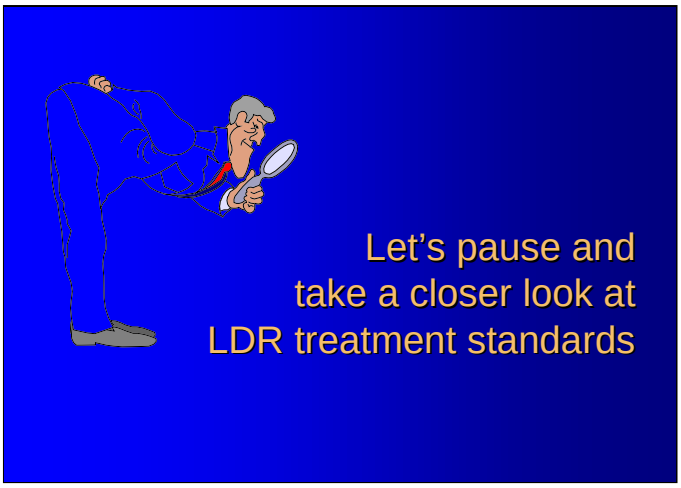
Unfortunately, it is never as simple as it seems. EPA failed to consider how the revised treatment standards apply in states that have adopted the LDR program (i.e., LDR-authorized states). EPA (January 3, 1995; 60 FR 242) decided that the revised standards are neither more nor less stringent than the previous standards. Therefore, the newly published standards do not supersede existing standards. States that are authorized under the LDRs for some or all waste streams will continue to implement the treatment standards that apply to the streams for which they are authorized. The new standards will not apply to those waste streams until the state has incorporated the new table into state law. Some wastes for which treatment standards appear only in the revised table [e.g., organic toxicity characteristic wastes (D018-D043)] are unaffected.



HSWA established deadlines by which EPA was to implement rules defining the conditions under which land disposal could occur. Those deadlines affected wastes that were listed or identified as hazardous on or before November 8, 1984, and were broken down as follows:

- Solvents and dioxins -- November 8, 1986
- California list wastes -- July 8, 1986
- First Third -- August 8, 1988
- Second Third -- June 8, 1989
- Third Third -- May 8, 1990

As you can see, in general, all of the statutory deadlines have passed. However, HSWA also directed EPA to establish standards for wastes listed or identified as hazardous ***after*** November 8, 1984 (so called "newly listed wastes") within six months after being listed or identified. EPA did not meet the statutory deadlines for most newly listed wastes. Consequently, the Environmental Defense Fund sued EPA [*Environmental Defense Fund (EDF) v. Reilly*, Civ. No. 89-0598, D.D.C.]. The suit resulted in a consent decree that set forth deadlines for the issuance of standards and prohibitions for each of four groups of newly listed and newly identified wastes. The first group is called "Phase I," the second group is called "Phase II," and so forth. Of these phased rulemakings, the final component of Phase IV was proposed on May 12, 1997 (62 FR 26041).



Selected excerpts from the table appearing in 40 CFR 268.40, table "Treatment Standards for Hazardous Waste" and the universal treatment standard (UTS) table appearing in 40 CFR 268.48, Table UTS, are provided at the end of this module. Participants are directed toward theses tables to address the three exercises following this page.

- **BACKGROUND:**
  - "Spent" liquid scintillation cocktails (measure the activity of radionuclides)
  - Principal organics are xylene and toluene, which were used to mobilize constituents (i.e., used for their solvent properties)
  - Formulation contained greater than 10% toluene before use
  - [Other hazardous constituents] = BDL (below detection limit)
- **EXERCISE:**
  - Identify the applicable LDR treatment standard(s).

NOTES:

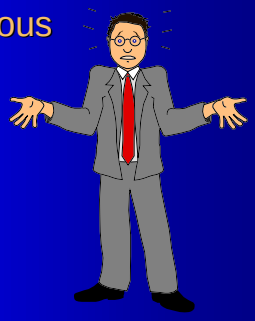
- **BACKGROUND:**
  - Spent battery (sulfuric) acid
  - pH < 2
  - [Cd] (Cadmium) = 3.3 mg/l (TCLP)
  - [Cr] (Chromium) = 3.2 mg/l (TCLP)
  - [Pb] (Lead) = 22 mg/l (TCLP)
  - [Other hazardous constituents] = BDL (below detection limit)
- **EXERCISE:**
  - Locate the applicable treatment standard(s)

NOTES:

- **BACKGROUND:**
  - Untreated “spent” petroleum naphtha (parts degreaser)
  - Flash point = -60° F
  - > 10% Total Organic Carbon (TOC) as generated
  - [Cd] (Cadmium) = 0.1 mg/l (TCLP)
  - [Cr] (Chromium) = 3.2 mg/l (TCLP)
  - [Pb] (Lead) = 1.2 mg/l (TCLP)
  - [Other hazardous constituents] = BDL (below detection limit)
- **EXERCISE:**
  - Identify the applicable treatment standard(s)

NOTES:

CRITERION 2: How do I ensure wastes are treated to meet all applicable hazardous waste codes?



A notification is used to disclose that wastes subject to the LDR are among the manifested wastes shipped off-site for management. The notice is also used to inform the receiving facility if a waste is subject to a variance or extension.

In the past, the notification was required to include the EPA Hazardous Waste Number; the corresponding treatment standards for wastes F001 through F005 (spent solvents), F039 (multisource leachate), the California-list wastes, and for underlying hazardous constituents in certain D001 (ignitable) and D002 (corrosive) wastes; the manifest number associated with the shipment of waste; and waste analysis data, if available.

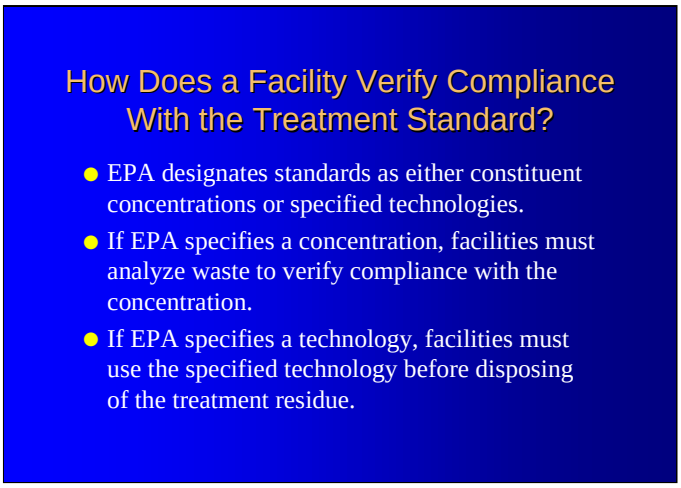
Alternatively, for wastes other than those specifically identified (F001-F005, F039, etc.), a generator could provide sufficient information for the receiving facility to look up the appropriate treatment standard in the CFR. Such information was to include the waste code, the subdivision of the waste code (e.g., D003, reactive cyanide subcategory), the waste form (i.e., wastewater or nonwastewater), and the CFR section(s) and paragraph(s) where the applicable treatment standard appear.

Modifications to the notification requirements under Phase II LDR regulations reduced the information required on notification forms. Generators must now include the waste code(s) and the waste constituent(s) for which the treater must monitor wastes categorized as F001-F005, F039, D001, D002, D012-D043 and the California-list wastes. LDR-authorized states, however, may be required to modify their LDR regulations to reflect this approach before generators may begin following the reduced requirements.

In some cases, a facility must both notify and certify. A treatment facility that conducts an initial treatment in a multiphase treatment train must certify that treatment meets the standard for the hazard treated and notify the off-site facility of any hazards remaining in the waste. Notification and certification requirements are found in 40 CFR 268.7.

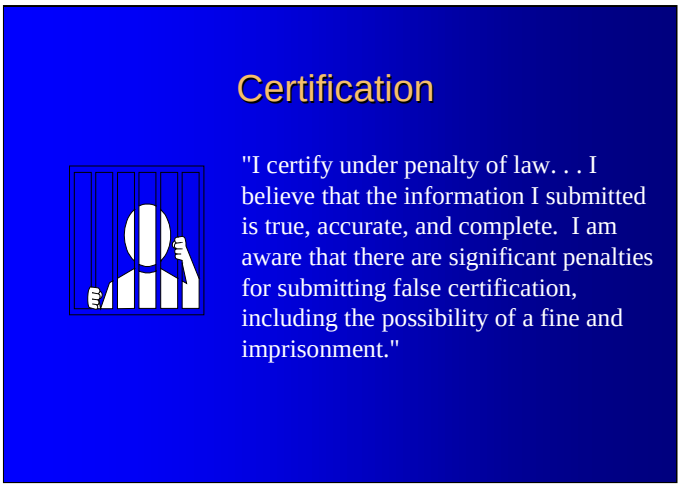
Why is notification necessary?

- Manifests used to ship hazardous waste to off-site facilities only require proper shipping name
- Proper shipping name is typically based on greatest hazard, not necessarily on all LDR-regulated constituents present in the waste



In general, to verify compliance with numeric treatment standards, facilities must analyze the constituent concentration in wastewaters or the constituent concentration in the waste extract for nonwastewaters. For nonwastewaters, the toxicity characteristic leaching procedure (TCLP) is used to obtain the waste extract, which is then analyzed for the appropriate constituents. Constituent concentrations are then compared against the EPA-established numeric treatment standards listed in 268.40 and/or 268.48. Wastes whose constituent concentrations exceed their UTS remain prohibited from land disposal. If, however, the waste or the waste extract meets the treatment standard, the treatment residue can then be land disposed.

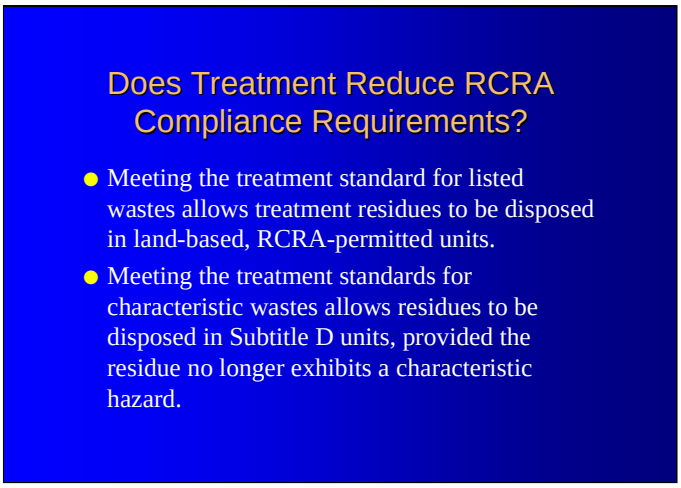
To verify compliance with a specified technology, facilities must document use of the specified technology.



A certification, which is signed by an authorized representative, is used after the waste is verified as meeting the applicable treatment standard(s) and, therefore, can be land disposed. Certifications carry substantially more liability than LDR notifications.

The applicability of the EPA-specified certification statements hinges on whether a person is certifying as a generator, treatment facility, or disposal facility. Generators who also treat are classified as treaters and are required to prepare a treater's certification (59 FR 48015). Certification language for each party is specified in the regulations and must be included verbatim.

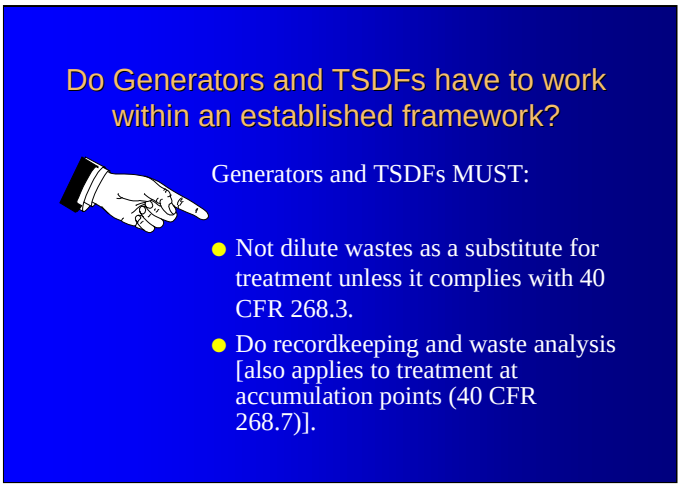
Until recently, certification that a waste met its applicable treatment standards was required to be submitted with ***each*** shipment of hazardous waste. As part of EPA's efforts to improve the LDR program, the Agency recently revised LDR certification requirements by allowing generators/treaters to submit a one-time certification with the first waste shipment to the receiving facility and place it in the facility files [May 12, 1997 Federal Register (62 FR 26020)]. Be aware that this policy is less stringent than many authorized State LDR certification requirements. Therefore, the reduced requirements will not apply until an authorized State adopts the new certification provisions.



Occasionally facility personnel assume that treatment to the LDR is a way "out" of RCRA. Treatment to comply with the LDR does not relieve a facility of its responsibility to comply with hazardous waste requirements. Treatment to the LDR standard only allows disposal in a RCRA-permitted disposal facility. The waste cannot be disposed in or on the land without treatment to the LDR standard.

The "derived-from" rule is the reason treatment is not necessarily an exit from RCRA's hazardous waste requirements. Under the derived-from rule, treatment residues from listed hazardous wastes are also hazardous wastes [40 CFR 261.3(c)(2)]. Therefore, treatment residues derived from the treatment of listed hazardous waste must be disposed in Subtitle C (hazardous-waste permitted) facilities.

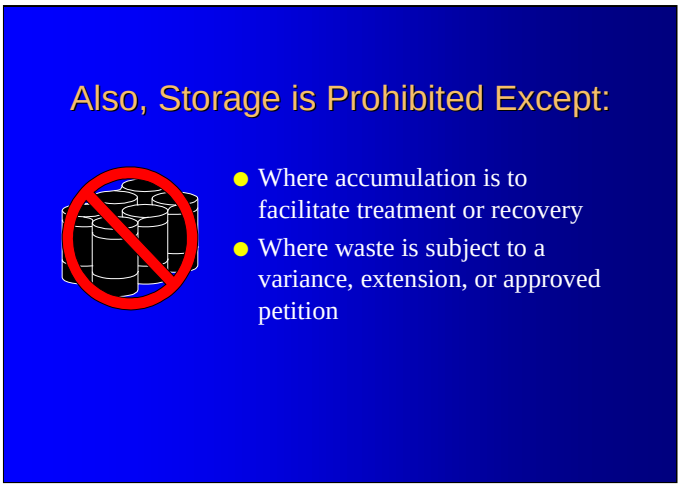
EPA established special regulatory requirements (40 CFR 268.9) for characteristic wastes that are no longer hazardous waste after treatment. These special provisions are needed because Subtitle D facilities are not usually involved in the LDR program. The special provisions place some of the record-keeping requirements under the LDR on the Regional EPA Administrator (or the delegated authority) instead of the Subtitle D facility.



In addition to identifying all applicable waste codes and ensuring wastes are treated to meet the applicable treatment standards, generators/TSDFs must comply with RCRA's prohibition on diluting waste to meet the applicable treatment standard(s). This is the only explicit prohibition on dilution in RCRA's hazardous waste provisions.

EPA and Congress, however, recognize that some dilution occurs in the course of commingling waste streams for treatment in wastewater treatment units. To address legitimate aggregation of centrally-managed wastewaters, Congress passed the Land Disposal Program Flexibility Act of 1996 ((LDPFA) PL. 104-119, 100 Stat. 830). The new legislation states, in essence, that hazardous wastes which are hazardous solely because they exhibit a characteristic (including listed wastes (e.g., F003, U002)) are not prohibited from land disposal if they are managed in a treatment system that is: (1) discharging to waters of the United States under a National Pollutant Discharge Elimination System (NPDES) permit issued under Section 402 of the Clean Water Act (CWA); (2) discharging to a publicly-owned treatment works (POTW) in compliance with the pretreatment requirements under CWA Sect. 307; (3) performing CWA-equivalent treatment before discharging to a dry riverbed, evaporation pond, or spray irrigation field under a zero-discharge permit; or (4) injecting into Class I nonhazardous injection wells regulated under the Safe Drinking Water Act (SDWA).

Another of the special generator requirements under the LDR is that for a waste analysis plan for treatment at accumulation points. Before implementing this LDR provision, EPA required that generators determine whether their wastes are hazardous (40 CFR 262.11) and that permitted and interim status TSDs have a waste analysis plan (40 CFR 264.13 and 265.13). RCRA, however, allows generators to treat their waste without a permit in tanks and containers at points accumulating waste in compliance with 40 CFR 262.34. Before the LDR, such points did not need to have a waste analysis plan. Under the LDR [40 CFR 268.7(a)(4)], they must now have a plan to analyze waste and ensure that the treatment standards are met.



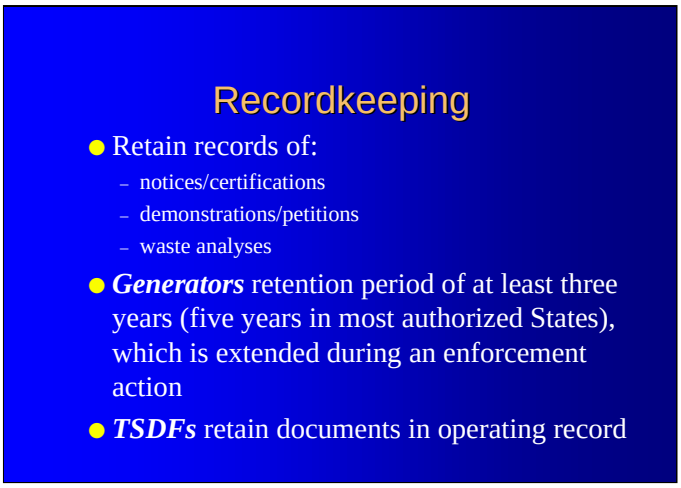
RCRA Section 3004(i) prohibits the storage of wastes that have been prohibited from land disposal, unless that storage is for the purpose of accumulating sufficient quantities of hazardous waste to facilitate proper treatment and subsequent disposal. This language is codified in 40 CFR 268.50.

One of the common misconceptions about the storage prohibition has to do with when it applies. Some believe that storage is only allowed for up to one year. This, however, is not the case. For storage that has occurred less than a year, the burden is on EPA to prove that storage is for some purpose other than facilitating treatment or recycle and proper disposal of the resulting residue. If, however, storage of as prohibited waste exceeds one year, the facility owner/operator bears the burden of proving that the sole purpose for storage is to facilitate treatment or recycle and ultimate disposal of the reside.

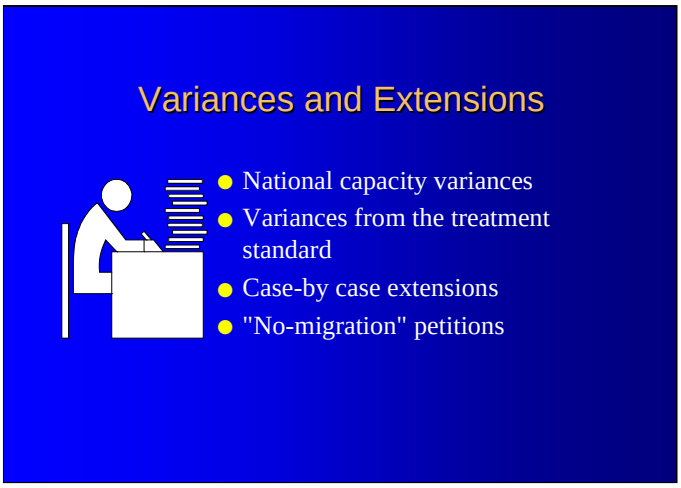
It should be noted that some wastes are not subject to the storage prohibition. These include the following:

- wastes that have been treated to meet the applicable treatment standards,
- wastes that are eligible for an extension or variance from LDR, and
- wastes that qualify as universal wastes.

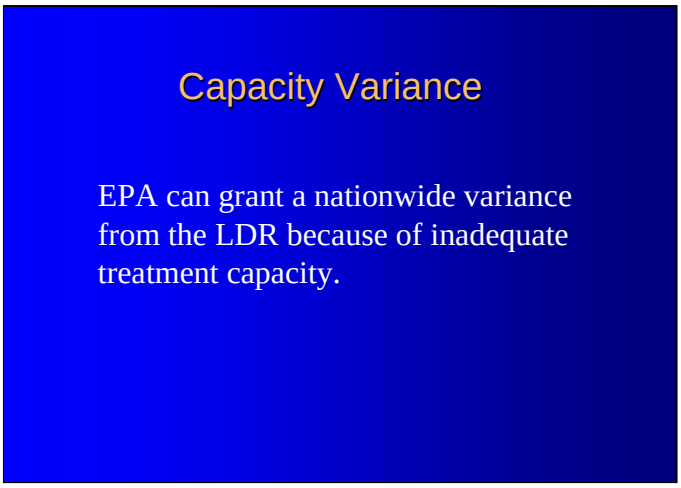
Relative to universal wastes, in addition to being explicitly exempt from the LDR storage prohibition, they are also exempt from 40 CFR 268.7 waste analysis and recordkeeping requirements.



Generators and TSDFs must retain records to document compliance with the LDR requirements. Records must be retained for three years for RCRA's requirements not related to the LDR. Until recently (and as will remain the case in authorized States until they adopt the less stringent provisions), records required under LDR were required to be maintained for five years. In order to make LDR requirements consistent with other RCRA retention periods while improving the LDR program, in the May 12, 1997 Federal Register EPA reduced the five-year period to a three-year retention time period. [40 CFR 268.7(a)(8)]



Compliance with LDR standards is especially difficult when treatment capacity and technology are not available, as is the case with many radioactive mixed wastes. RCRA provides variances and extensions to the effective date of regulations to accommodate site-specific concerns such as lack of treatment capacity.

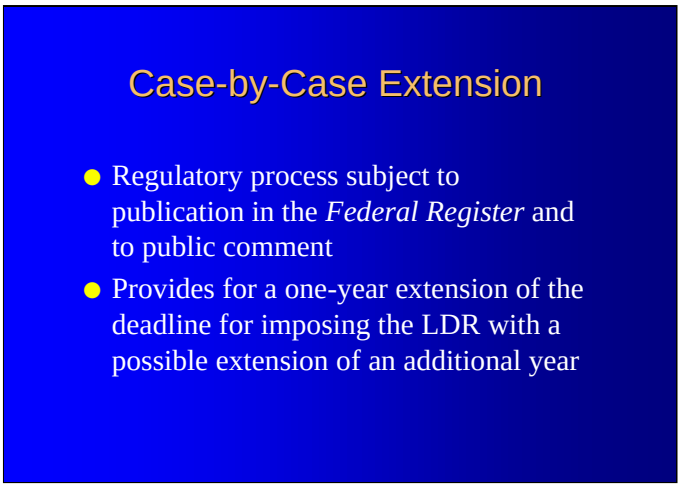


EPA can and did grant capacity variances based on evaluations of treatment capacity during development of the LDR regulations. The capacity variances have expired for hazardous wastes listed or identified in 1984 when HSWA was enacted. Capacity variances could be granted for newly identified wastes that lack adequate treatment capacity.

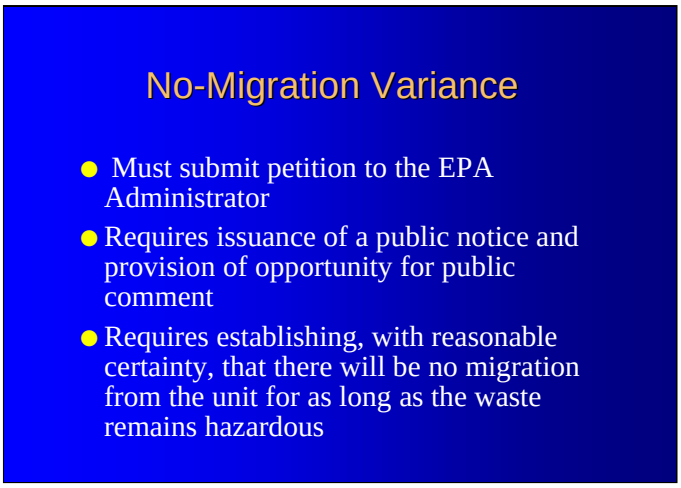
Variances from the treatment standards are addressed in 40 CFR 268.44.

Waste-specific variances create new treatability groups. The facility seeking a variance, as Savannah River has, must petition the EPA Administrator. EPA issues a notice in the Federal Register of its intent to grant the variance. Once finalized, the variance from the existing standard (i.e., establishing an alternative standard) is available for all generators of the waste for which the variance was granted.

A facility- and waste-specific variance does not require public notice and comment. However, it only applies to the specific facility's waste. Such a variance can be granted by the Assistant Administrator or his designee.



A case-by-case extension (40 CFR 268.5) is similar to a capacity variance in that it is based on a lack of available capacity. Unlike a capacity variance, however, it is granted only for the petition applicant, not for all wastes of the type for which the extension is sought. In order to obtain a case-by-case extension, an applicant must demonstrate efforts to contract for existing treatment or recovery capacity and enter into a binding contract for alternative capacity. Alternate capacity must be sufficient to treat the applicant's waste.

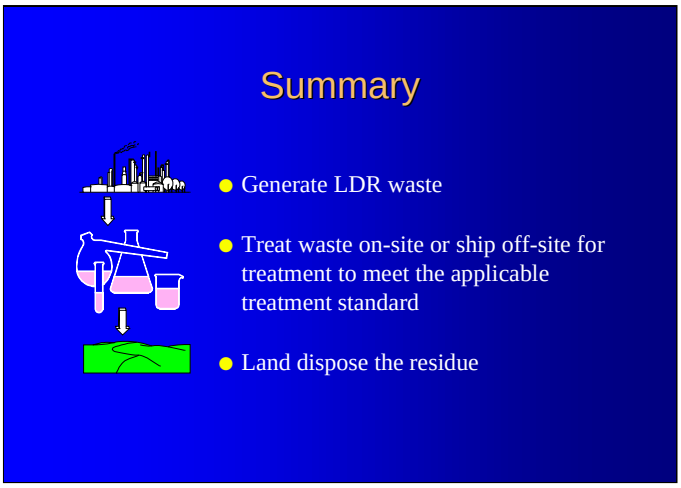


A no-migration petition (40 CFR 268.6) must address the specific wastes to be disposed of in the unit for which the petition is sought. Waste analysis data must be submitted to support the petition. Further, comprehensive characterization of the disposal unit, including background air, soil, and water quality data, must be submitted as a part of the petition. The petition must include a monitoring plan and address means to assure compliance with applicable laws and regulations.

DOE applied for a no-migration variance for the Waste Isolation Pilot Plant.

The LDR regulations include complex and somewhat obscure points such as the variations on requirements for notification.

The LDR framework has been challenged several times in court. For example, a recent influential challenge was Chemical Waste Management v. EPA, 976, F.2d 2 (D.C. Circuit, 1992). As a result of this challenge, treatment standards for certain ignitable and corrosive wastes have changed. Changes in treatability standards are sometimes imbedded in revisions whose primary focus is some other aspect of LDR. Consequently, keeping up with changes in treatment standards is very difficult.



To summarize the LDR program, generators must evaluate their wastes to determine if the waste are restricted from land disposal, comply with the dilution prohibition, and ensure that LDR wastes are properly managed and treated to meet LDR requirements before disposal. Most wastes must be treated to meet numeric standards based on the performance of best commercially available treatment processes. A few wastes must be treated by a specified treatment technology before land disposal. Compliance with the treatment standards is verified by analysis or documentation that the specified technology was used.

The ultimate disposition of the treatment residue depends on whether the waste is a listed hazardous waste or a characteristic hazardous waste. Residues from the treatment of listed hazardous wastes are also listed hazardous wastes under the derived-from rule in 40 CFR 261.3(c)(2). Such treatment residues must be disposed of in a hazardous waste disposal facility regulated under Subtitle C of RCRA.

If characteristic hazardous wastes are treated and the treatment residue is no longer a characteristic hazard, the treatment residue may be disposed of in a solid waste disposal facility regulated under Subtitle D of RCRA. Wastes generated from cleanup may also meet requirements for disposal as nonhazardous waste when certain conditions are met.