



NEWMOA

RCRA Compliance at Cleanup Sites: Waste Treatment & Land Disposal Restrictions

February 25, 2020

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Determining if the Environmental Media Contains a Hazardous Waste



Point of Generation for a Solid Waste

Section 262.11 requires a person who generates a solid waste to determine if that solid waste - at its point of generation (POG) - is also a hazardous waste.

- This determination includes identifying all applicable hazardous waste codes.
- **This determination must be accurate.**
- It is at this point the LDR treatment standard attach to the hazardous waste (November 7, 1986; 51 FR 40620, and July 8, 1987; 52 FR 25766).

For contaminated environmental media the POG is when the soil is excavated or the groundwater is pumped out of the ground (May 26, 1998; 63 FR 28617, RO 13748 & 14283).

When a Point of Generation Occurs

DRAFT

| Activity Generating the Waste | | POG for 268.7(a)(1) Purposes | POG for s. 262.11 Purposes | Reference |
|---|--------------------|------------------------------|----------------------------|---|
| 1. A hazardous waste is generated or removed from a manufacturing process. | Initial Generation | Yes | Yes | November 7, 1986; 51 FR 40620 July 8, 1987; 52 FR 25766 April 4, 2006; 71 FR 16872 |
| 2. A remediation waste in which placement occurs. | | Yes | Yes | 268.49(a) RO 11954 and RO 11948 |
| 3. For any characteristic hazardous waste when the treatment residue exhibits a new characteristic that is not exhibited by the original waste. | Treatment Residue | Yes | Yes | |
| 4. For characteristic hazardous waste and ICR listed hazardous waste when managed in non-CWA/CWA-equivalent system or a non-class 1 SDWA system and the treatment residue is in a different treatability group then the original waste. | | No | Yes | May 24, 1993; 58 FR 29871 May 16, 2001; 66 FR 27166 & 69 |
| 5. For listed hazardous waste that are listed due to toxicity and the treatment residue is in a different treatability group then the original waste. | | Yes | Yes | RO 14448 Derived from rule applies: s. 261.3 (a) to (d) & (g) |
| 6. For characteristic hazardous waste and ICR listed hazardous waste that are managed in a CWA/CWA-equivalent system or a class 1 SDWA system and the treatment residue is in a different treatability group then the original waste. | | Yes | Yes | June 28, 1996; 61 FR 33681 May 12, 1997; 62 FR 26007 May 11, 1999; 64 FR 25408 May 16, 2001; 66 FR 27269 RO 14207, RO 14216, and RO 14718 |
| 7. Residues generated from retorting of D009 hazardous wastes. | | Yes | Yes | RMERC Table 1 s. 268.42 May 1990: Final Best Demonstrated Available Treatment Technology (BDAT) Background Document for Mercury-Containing Wastes D009, K106, P065, P092, and U151 |

Point of Generation for Environmental Media

For environmental media it is when placement occurs:

Placement **does not occur** when the environmental media is:

- Treated in-situ.
- Capped in place.
- Processed within an area of contamination (AOC) to improve structural stability.

If placement does not occur, then the RCRA requirements are not triggered (RO 11954).

Placement **does occur** when the environmental media is:

- Consolidated from different AOCs into a single AOC.
- Moved outside of an AOC (e.g., storage, treatment) and returned to the same of different AOC.
- Excavated from an AOC, placed in a separate unit (e.g., containers, tank) that is within the AOC and redeposited into the same AOC.

If placement occurs then, the RCRA requirements are triggered.



Environmental Media is not a Waste

- A solid waste is any discarded material (s. 261.2).
- Environmental media (e.g., soil and groundwater) are not a solid waste since they have never been discarded.
- The mixture rule only applies to hazardous waste when mixed with solid waste (s. 261.3(a),(b)&(g)).
- Therefore the mixture rules do not apply to environmental media that is contaminated.
- EPA decided that when environmental media contains a hazardous waste the environmental media must be managed as if it were a hazardous waste (RO 11195, 11434, & 11593).
- EPA's decision on how to manage contaminated environmental is known as the contained-in policy.



Common Exclusions from a Hazardous Waste

- Petroleum contaminated media and debris are excluded from regulation as a hazardous waste when they only exhibit a characteristic of D018 to D043 and the tanks are subject to regulation under 40 CFR 280 (261.4(b)(10)).
- Manufactured Gas Plant (MGP) waste is excluded from TCLP testing. MGP waste is only a hazardous waste if it is ignitable, corrosive, or reactive (261.24, RO 14491 and 14492).



**Determining if the Environmental
Media Contains a
Listed Hazardous Waste
(Good Faith Effort)**



Disposal of Listed Hazardous Waste Prior to the Effective Date

Listed Hazardous Waste

- The hazardous waste listings apply retroactively to wastes land disposed prior to the effective date of the listings (57 FR 37284, 37298; August 18, 1992).
- All wastes meeting the listing description are hazardous regardless of when they were disposed.
- The time at which a waste was disposed does not affect whether or not it meets the listing description (53 FR 31138, 31147; August 17, 1988).



The Good Faith Effort for Listed Hazardous Waste

- To make a listed hazardous waste determination the source must be known.
- Sampling is used to show if the constituents of a listed waste are present.
- The 'good faith effort' is not codified; however, it is discussed in the following federal registers:
 - December 21, 1988 (53 FR 51444)
 - March 13, 1990 (55 FR 8758)
 - April 29, 1996 (61 FR 18805)



The Good Faith Effort for Listed Hazardous Waste

Case Example

A consultant's report for a cleanup site stated in regards to making a good faith effort that the sources of the contamination is unavailable or inconclusive. A quick review by the hazardous waste program showed the following:

- Facility is the type of facility that would use chlorinated solvents, like TCE, to clean metal parts. TCE when used for degreasing/cleaning is a F002.
- A site plan map shows an area labeled as '*Washer*'. Report states that solvents were stored in this room.
- A site plan map shows an area labeled as '*Drum Storage*'. Outdoor drum storage areas are typically used to store waste materials, such as TCE. The drum storage area shows TCE/PCE contamination of the soil.
- The report shows an AST containing TCE. The AST is believed to have been adjacent to the drum storage area. The suspected area of the AST shows TCE/PCE contamination of the soil.
- It is more likely than not that the AST containing TCE was used for product storage. Products are typically stored in tanks.
- It is more likely than not that waste TCE was stored in containers in the drum storage area and in other areas of the facility.



The Good Faith Effort for Listed Hazardous Waste

Continued

- The Department's manifest system shows large volumes of F002 being shipped off-site from 1982 – 1984. After 1984 TCE solvent use decreased dramatically.
- TCE contamination around the AST would be a U listed hazardous waste assuming that the AST was used for product storage of TCE.
- TCE contamination around other areas is an F listed hazardous waste assuming that spent TCE was spilled.
- Some of the TCE contaminated media fails TCLP.
- Because of the large areas impacted by TCE we can safely assume that there were multiple releases over a period of time. These releases likely occur when the facility first started using TCE and up until at least 1984. After 1984 chlorinated solvents use decreased dramatically until they stop using chlorinated solvents in 2000.
- No other information was presented in the report indicating that the TCE came from non-listed sources.

Based on the above it would be irresponsible to say (not keeping with the good faith determination) that the information on the sources of the contamination is unavailable or inconclusive. The civil burden standard needed to show a release of a listed hazardous waste is a preponderance of evidence. This standard is met if the proposition is more likely to be true than not true. In other words, the standard is satisfied if there is greater than 50 percent chance that the proposition is true.



Determining if the Environmental Media Contains a Characteristic Hazardous Waste (Representative Sampling)



Sampling Required for Characteristic Hazardous Waste

261.21 Ignitability characteristic. (a) A solid waste exhibits the ignitability characteristic if a **representative sample** of the waste has any of the following properties: ...

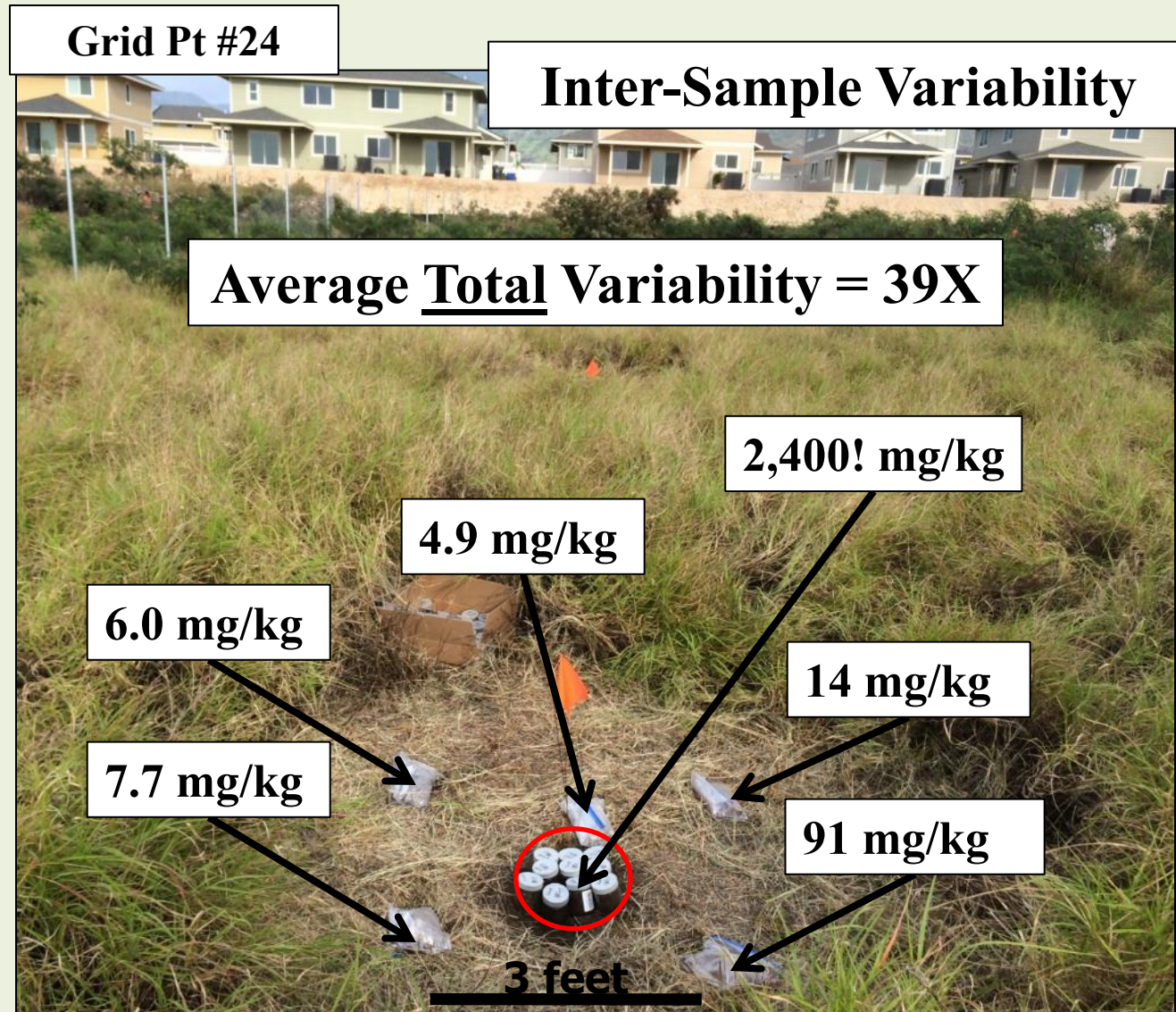
261.22 Corrosivity characteristic. (a) A solid waste exhibits the corrosivity characteristic if a **representative sample** of the waste has either of the following properties: ...

261.23 Reactivity characteristic. (a) A solid waste exhibits the reactivity characteristic if a **representative sample** of the waste has any of the following properties: ...

261.24 Toxicity characteristic. (a) A solid waste (except manufactured gas plant waste) exhibits the toxicity characteristic if, using the toxicity characteristic leaching procedure, Method 1311 in “Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods”, EPA SW-846, incorporated by reference in 260.11, the extract from a **representative sample** of the waste contains any of the contaminants listed in Table 2 at the concentration equal to or greater than the respective value given in that table. Where the waste contains less than 0.5% filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract for the purpose of this section.

Soil Sample Variability

Soils and wastes that are solids are highly heterogeneous. Therefore, determining the mean concentration of an analyte is highly susceptible to sampling errors from a variety of sources.



| Sources of Sampling Error | |
|---------------------------|---------------------|
| Sampling | Up to 1,000% |
| Sample Preparation | Between 100 to 300% |
| Analysis | Between 2 and 20% |



Non-Probabilistic Sampling

- Non-Probabilistic Sampling
 - Uses sampler's judgement.
 - Where to collect sample.
 - How much to collect.
 - Cannot make an inference regarding locations not sampled.
 - Cannot perform statistics.
 - May be bias high depending on objectives.



Probabilistic Sampling

- Probabilistic Sampling
 - Sampling to make inferences regarding locations not sampled.
 - Sampling so the results can be expressed with a scientific degree of confidence.
 - Necessary for statistical analysis.
 - Used primary for:
 - Determining averages.
 - Determining proportion of a population that is over/under a limit.
 - Search sampling.
- With probabilistic sampling (ISM & DQO) you can make a conclusion using fewer resources, results are independent of the sampler, uses the scientific method*, repeatable, and defensible. Requires a representative sample.

* a method or procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses.



Incremental Sampling Methodology

- What is Incremental Sampling Methodology (ISM)?
 - A structured composite sampling and processing protocol.
 - 30 to 100 “increments” collected to represent an average concentration over a defined area of interest (decision unit).
 - Increments are grid-based or random.
 - Design to address natural heterogeneity in the environmental media.
 - Every particle within the sample area has an equal probability of being sampled, and of being analyzed.
 - Reduces sampling and analytical error.

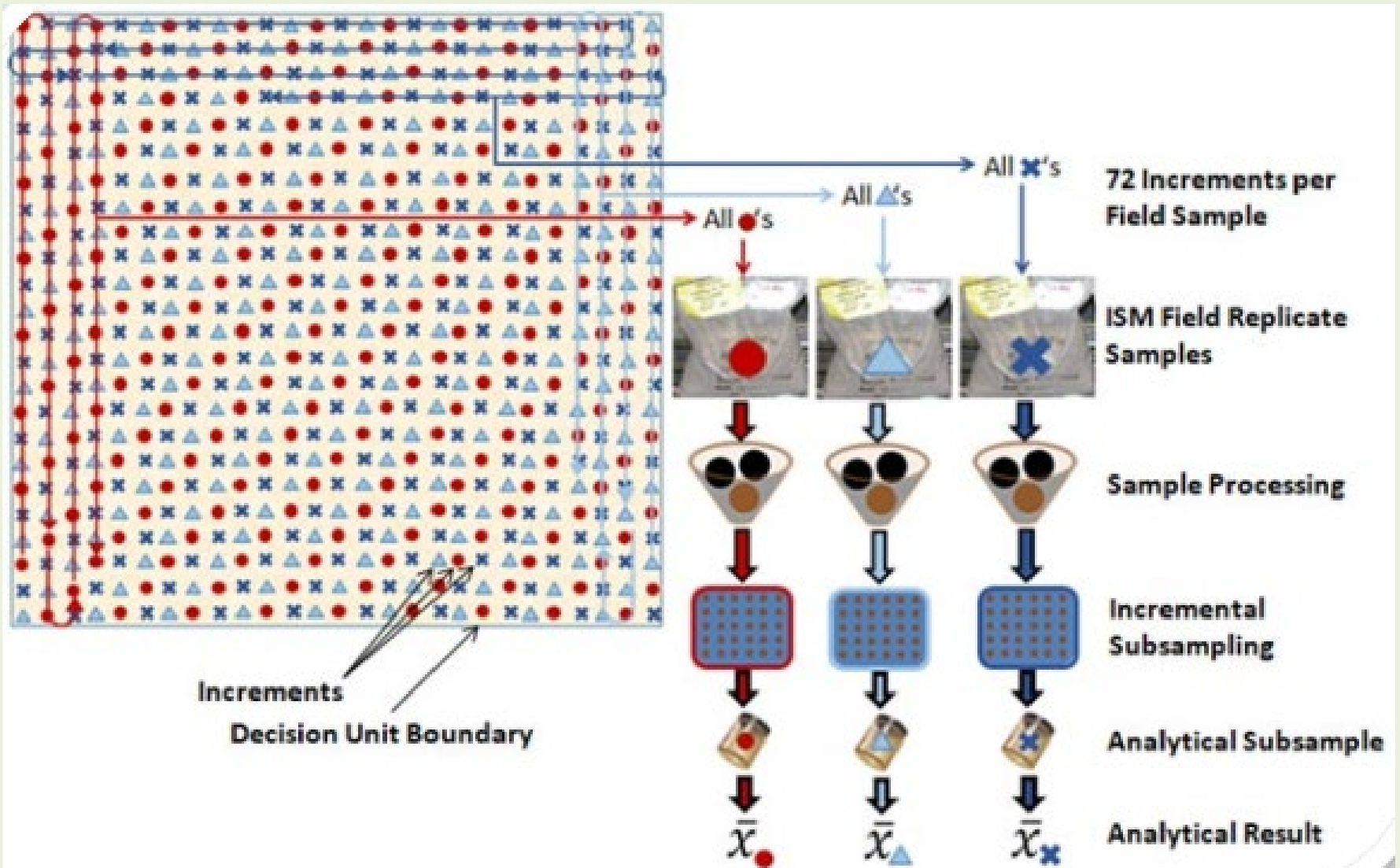


Incremental Sampling Methodology

Why Use Incremental Sampling Methodology?

- Site histories are rarely 100% known.
- Contaminant distribution is not homogeneous or predictable.
- All soil and most waste are heterogeneous in composition, which has effects on how it is distributed and measured.
- Provides close to a true mean of a volume of environmental media.
- Reduces data variability.
- Provides defensible data because it is highly reproducible.
- Data Quality Objectives process gets the entire team on board.
- The Myth of Maximum Concentrations:
 - Cannot be defined unless an infinite number of samples are collected.
 - Does not reflect the level of potential affects/risk.
 - Does give a representation of variability.

Assessing Variability of the Decision Unit





Decision Unit

Decision Unit: Is the smallest volume of soil/waste for which a decision will be made based on.

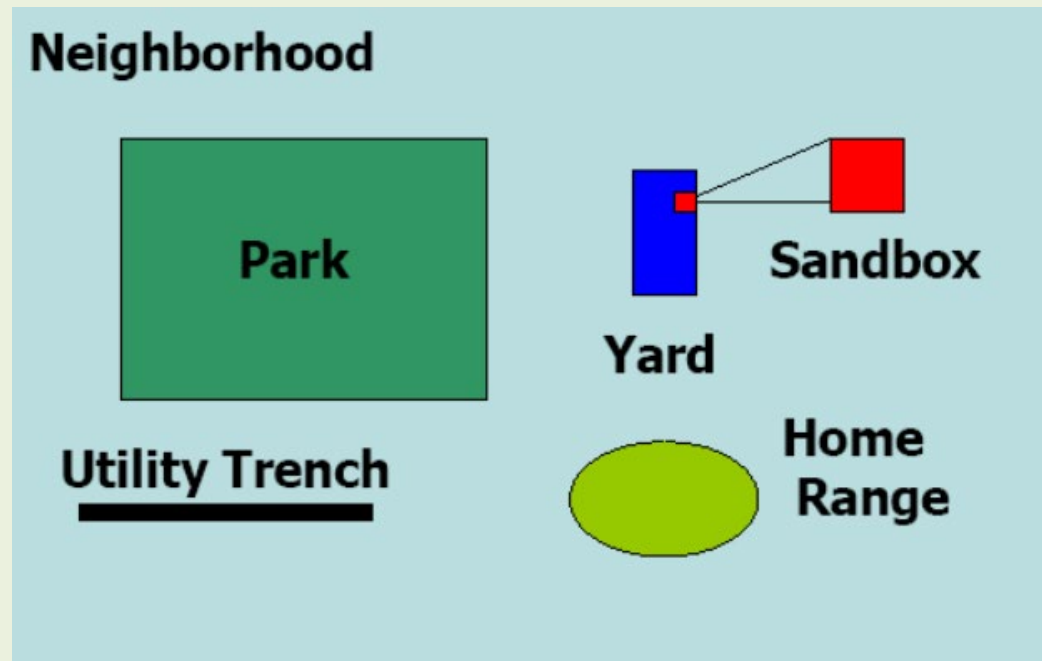
- What questions will be answered by the data?
- What decisions will be made with the data?

Defined by:

- Area
- Depth
- Time
- Geology
- Geography
- Regulation - RCRA decision unit include: container, tank, waste pile.

Factors that Matter:

- Source characterization
- Nature and extent
- Contaminant boundaries



Source: https://www.itrcweb.org/Documents/2010_Meetings/State-of-the-Art-of-Incremental-Sampling-Methodology-Science-and-Application-Earl-Crapps.pdf



Decision Unit



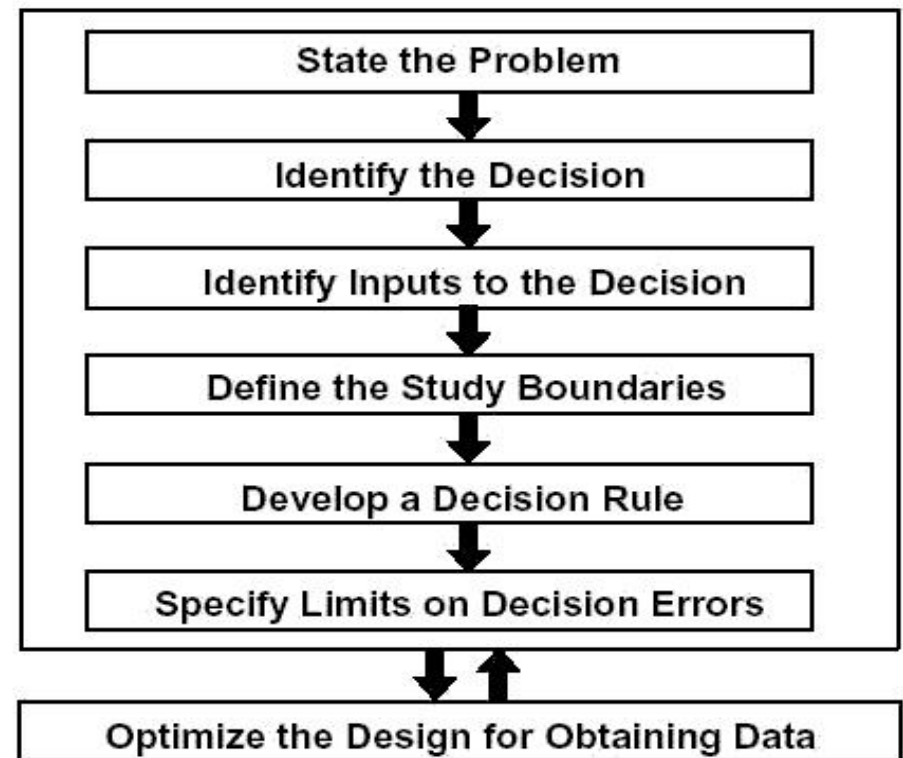


Decision Unit



Data Quality Objective Process

Data Quality Objective Process: The DQO Process is a seven-step planning approach to develop sampling designs for data collection activities that support defensible decision making.





RCRA Requirements Applicable to Treating Environmental Media



What is Treatment?

The first part focus on whether a given activity changes the properties of a hazardous waste.

- Any method, technique or process, including neutralization, which follows generation and which is designed to change the physical, chemical or biological character or composition of any hazardous waste ...

The second part looks at the intent of the waste management activity.

- ... so as to neutralize the hazardous waste or so as to render the waste nonhazardous, safer for transport, amenable for recovery, amenable for storage or reduced in volume.



Examples of Treatment?

Examples:

- Compacting waste within a drum.
- **Chemical oxidation of organic chemicals.**
- **Stabilization of soil.**
- Solidification of paint waste.
- Precipitation of heavy metals solutions.
- Neutralization of spent lead acid batteries.
- Crushing lamps in a drum.

Remediation Variance or Remedial Action Plan (RAP)

- A variance from the requirement to obtain a license if it is determined that the application for or compliance with a license would cause an undue or unreasonable hardship for any person (s. 270.79).
- A variance may not result in undue harm to public health or the environment and the duration of the variance may not exceed 5 years.



The Eight Permit RCRA Exempt Treatment Methods

- **Treatment in Wastewater Treatment Units (WWTU).**
- **Treatment in 90/180/270-day accumulation units.**
- Recycling.
- Elementary Neutralization Unit (ENU).
- Totally Enclosed Treatment Facility (TETF).
- Adding absorbents to waste.
- Immediate responses.
- Burning small quantities of waste in on-site units.

Wastewater Treatment Units (WWTU)





Wastewater Treatment Units (WWTU)

- Exemption is found in ss. 270.1(c)(2)(v), 264.1(g)(6), and 265.1(c)(10).
- The WWTU exemption is attached to the equipment not the waste.
- WWTU exemption applies to any tank or tank system that is dedicated for use with an on-site wastewater treatment.
- Tanks do not need to be hard piped to meet the WWTU exemption.
- The WWTU exemption can apply to hazardous waste that is receive from off-site.
- WWTUs that leak are not eligible for the exemption. WWTU are Solid Waste Management Units (SWMU) and are therefore can be subject to corrective action.



Wastewater Treatment Units (WWTU)

- The WWTU exemption is to avoid duplicative control standards under both RCRA and Clean Water Act (CWA).
- To qualify for the WWTU exemption, the WWTU must meet 3 criteria:
 - Part of a wastewater treatment facility that is subject to regulation under either 33 USC 1317(b) or 1342.
 - Receives and treats or stores an influent wastewater that is a hazardous waste as defined in s. 261.3, or that generates and accumulates a wastewater treatment sludge that is a hazardous waste as defined in s. 261.3, or treats or stores a wastewater treatment sludge which is a hazardous waste as defined in s. 261.03.
 - Meets the definition of tank or tank system in s. 260.10.



Wastewater Treatment Units (WWTU)

- To qualify for the **first criteria** the WWTU must be subject to:
 - National Pollutant Discharge Elimination System (NPDES).
 - State's pretreatment program.
- It is not necessary that the permit be actually be issued or the pretreatment standards actually be in force. It is sufficient that the facility be subject to the requirements of the CWA.



Wastewater Treatment Units (WWTU)

- To qualify for the **second criteria** the WWTU must manage hazardous wastewater or hazardous wastewater treatment sludge.
- Wastewater is generally assumed to be waste that are “substantially water with contaminants amounting to a few percent at most” (RO 11020, 14472).
 - A mixture of 50% alcohol and 50% water. **No.**
 - D002 corrosive waste 95% water 5% total dissolved solids. **Yes.**
 - Spent solvents. **No.**
 - Petroleum tank bottoms. **No.**
 - Leachate from a landfill. **Yes.**
- Wastewater treatment sludge is any material that precipitates or otherwise is separated from wastewater during treatment (RO 11551).
 - Wastewater treatment sludges from electroplating operations. **Yes.**
 - Petroleum sludge from a tank. **No.**



Wastewater Treatment Units (WWTU)

- To qualify for the **third criteria** the WWTU must be a tank and tank system.
 - Tank means a stationary device, designed to contain an accumulation of hazardous waste which is constructed primarily of non–earthen materials (e.g., wood, concrete, steel, plastic) which provide structural support.
 - Containers used to store hazardous waste prior to treatment are not ancillary equipment.
 - Unlined earthen ditch used to convey hazardous waste to the WWTU are not ancillary equipment.
 - Tank system means a hazardous waste storage or treatment tank and its associated ancillary equipment and containment system.
 - Includes associated ancillary equipment.
 - Aeration tanks, blenders, clarifiers, dehydrators, dryers, evaporators, filters, grip chambers, presses, sludge digesters, thickeners, sludge dryers.
 - Sumps that are tanks (self-supporting walls).

Generator Treatment in 90/180/270-day Accumulation Units



Generator Treatment in 90/180/270-day Accumulation Units


- Exemption is found in an obscure reference in s. 268.7(a)(5).
- Explained in the Federal Register preamble (46 FR 2808 and 51 FR 10168) and other EPA guidance (RO 11261, 14618, 11163, 11641, and 12811).
- The permit exemption for generator treatment only extends to treatment activities that share the same standards as storage (i.e., the treatment must occur in tanks, containers, or containment buildings).

The standards for thermal treatment are different than generator storage requirements because of the inherent dangers of fire, explosion, or evolution of toxic gases; therefore, thermal treatment may not be performed without a hazardous waste permit.



Generator Treatment in 90/180/270-day Accumulation Units

- Generators can treat hazardous waste without a license in containers, tanks, drip pads and containment buildings. Provided that the generator is in compliance with:
 - Subpart I of 265 for containers
 - Subpart J of 265 for tanks
 - Subpart W of 265 for drip pads
 - Subpart DD of 265 for containment buildings
 - Subpart AA, BB, and CC of 265 also apply.
- The exemption only applies on-site generation that is within the generator's accumulation time period.
- Does not apply to the thermal treatment (e.g. burning, detonation) or evaporation of hazardous waste.
- Generators treating waste to meet the LDR requirements need to develop and follow a Waste Analysis Plan (WAP).



Treating to Meet the LDR Standards

Section 268.40(a) requires that the hazardous waste that is subject to an LDR treatment standard in s. 268.7(a)(1) to **meet that treatment standard prior to being land disposed**. This is true even if a characteristic hazardous waste has been rendered nonhazardous.

- For example, a D008 lead-containing waste was treated after its POG to 3 mg/l, which is 2 mg/l below the value of 5 mg/L needed to make the lead-containing waste a hazardous waste. The LDR treatment standard for this D008 subcategory is .75 mg/L. Even though the lead-containing waste is no longer a hazardous waste is still cannot be land disposed because the LDR treatment value of .75 mg/L has not been met.

A generator will need to develop a Waste Analysis Plan (WAP) if treating hazardous waste to meet the LDR standard.

- Generators treating hazardous debris under the alternative treatment standards of Table 1, s. 268.45, however, are not subject to these waste analysis requirements.

An easy way to meet the concentration-based standards in s. 268.40 is to dilute the hazardous waste – usually not allowed. Section s. 268.3 prohibits dilution as a substitute for adequate treatment to achieve compliance with the LDR requirements.



Waste Analysis Plan

- A waste analysis plan (WAP) is required when a generator is managing and treating prohibited hazardous waste or contaminated soil in tanks, containers, or containment buildings regulated under s. 262.17 to meet applicable LDR treatment standards found at s. 268.40.
- A WAP is not required when treating hazardous waste in exempt units.
 - Treatment in Wastewater Treatment Units (WWTU).
 - Elementary Neutralization Unit (ENU).
 - Totally Enclosed Treatment Facility (TETF).
 - Burning small quantities of waste in on-site units.

However, LDRs still need to be met if waste is to be land disposed.



Waste Analysis Plan

- Development of the WAP allows the generator to
 - analyze different treatment options.
 - provides for reliable waste identification.
 - promotes consistency in waste analysis, treatment, and disposal independent of changes in personnel.
 - describes how employee exposures will be minimized.
 - ensures adequate personnel training and re-training as conditions change.
 - provides for appropriate spill prevention and response.
 - describes the physical and chemical reactions that will occur in order to ensure waste compatibility with treatment.
 - demonstrates compliance with hazardous waste requirements.



Waste Analysis Plan

- The elements of a good WAP:
 1. Purpose (recommended).
 2. Facility description (recommended).
 3. Waste pre-acceptance and acceptance processes (required).
 4. Rejection policy (recommended).
 5. Discrepancy policy (recommended).
 6. Sampling strategies and frequency (required).
 7. Analytical parameters and test methods (required).
 8. Quality assurance/quality control and data reporting (recommended).
 9. Recordkeeping (recommended).
 10. Corrective and preventative action (recommended).
- Not all of the above 10 elements would be needed for a remediation site.
- The written WAP must be maintained in the facility files and be available for inspection by regulators.
- Records of all test results, waste analyses, and hazardous waste determinations must be kept for at least three years from the date the waste was last sent for final treatment, storage, or disposal.



Grab Sampling for LDR Treatment Requirements

Subpart C of part 261 requires a representative sample when analyzing for a characteristic hazardous waste. However, representative sampling is not used to show if the LDR standard has been met. Section 268.40(b) states:

- Non D004 through D011 wastewaters, compliance with concentration level standards are based **composite sampling** on maximums for any one day.
- For all nonwastewater and D004 through D011 wastewaters, compliance with concentration level standards is based on **grab sampling**.
- **In a well-designed and well-operated treatment system, the treatment standard should be achievable 99% of the time.**

To comply with the LDR treatment standard, no portion of the waste may exceed the standard. If testing results show that “hot spots” remain, this is evidence that the treatment was not effective and there is noncompliance with the LDR treatment requirements (see 63 FR 28567, May 26, 1998).



Applying the LDR Requirements to Environmental Media



Determining if the LDR Requirements Apply

Section 268.7(a)(1) requires a generator of a hazardous waste to determine if the hazardous waste needs to meet the LDR treatment standards prior to land disposal.

- This determination should be done concurrently with s. 262.11.
- LDR treatment standards only apply to waste that are a hazardous waste at the POG.

For contaminated environmental media the POG is when the soil is excavated or the groundwater is pumped out of the ground (May 26, 1998; 63 FR 28617, RO 13748 & 14283).

- Soils exhibiting a characteristic of a hazardous waste at the POG (excavation) must meet the LDR treatment standard prior to land disposal.
- Soils contaminated with a listed hazardous waste must meet the LDR treatment standard when land disposed unless the soil was contaminated before the LDR standards apply to the listed waste and a no longer contains determination (contained out) has been issued by the regulating authority at the POG (excavation).
 - Table at s. 268.49(a)
 - Table 2 in appendix VII of part 268.



Determining if the LDR Requirements Apply

LDRs are triggered if a generator's hazardous waste or residues from treating the generator's hazardous waste will ultimately be disposed in a **land disposal** unit.

- “Land disposal” means placement in or on the land, except in a corrective action management unit (CAMU) or staging pile, and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault, or bunker intended for disposal purposes.

Land disposal is not occurring for hazardous waste wastewaters managed in pipes and tanks prior to being discharged under NPDES or to sewer line leading to a POTW.

- Since land disposal is not occurring the waste are not subject to LDR treatment requirements.
- Cannot be conveyed by earthen ditches or managed in a surface impoundment.
- A onetime LDR notice must be kept in the facility's file (s. 268.7(a)(7)).



Determining if the LDR Requirements Apply

LDR requirements **do not apply** to all of the following:

- Hazardous waste is being disposed in a no-migration unit (RO 14843, s. 286.6).
 - A no-migration unit is a unit from which there will be no migration of hazardous constituents for as long as the waste placed in the unit remains hazardous. Examples: salt domes, monofill landfill located in an arid area that has no groundwater recharge, and underground injection wells.
- Hazardous waste moved within a land disposal unit (RO 11950).
- Hazardous waste remediation wastes that are managed in:
 - Corrective Action Management Units (CAMUs) (ss 264.551 & 264.552).
 - CAMU-eligible hazardous waste in off-site hazardous waste landfills (s. 264.555).
 - Temporary staging piles (264.554).
 - Area of Contamination (AOC) Policy (RO 11954, 11970, 13442, & 14112).



When to Identify the Underlying Hazardous Constituents

If the excavated media is a **characteristic hazardous waste** the generator shall comply with s. 268.9(a), which requires a generator to determine the **underlying hazardous constituents** (UHCs) of their characteristic hazardous waste.

- “Underlying hazardous constituent” means any constituent listed in s. 268.48, Table UTS—Universal Treatment Standards, 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.
- Does not include fluoride, selenium, sulfides, vanadium, and zinc.
- Origin of UTS table: Every chemical that has a concentration-based treatment standard.

Soils that are listed hazardous waste and are being treated under the alternative treatment standard must be treated for all constituents that are reasonably expected to be present (s. 268.49(c)(1), and RO 14628).

- Does not include fluoride, selenium, sulfides, vanadium, and zinc.



When to Identify the Underlying Hazardous Constituents

Does the characteristic code also need to be identified as a UHC?

Yes - according to s. 268.48(a); however,

- The preamble language in the September 14, 1993, federal register (58 FR 48115) states: *“However, if treatment of characteristic wastes must cease at the point they are no longer hazardous wastes, any underlying hazardous constituents (**hazardous constituents other than those for which the waste exhibits the characteristic**) can go untreated. 55 FR at 22652 (June 1, 1990).”*
- RCRA Orientation Manual 2014 states: *“However, some characteristic waste treatment standards have additional requirements. The regulated community must examine these wastes for underlying hazardous constituents. **These constituents are not what causes the waste to exhibit a characteristic, but they can pose hazards nonetheless.**”*



When Characteristic Codes are Carried on Listed Waste for LDR Purposes

Section 268.9(a)&(b) specifies when characteristic codes are carried on listed waste for LDR purposes.

- If the treatment standard for a listed waste addresses the constituent causing the waste to exhibit the characteristic, only the listed waste (and treatment standard) applies.
- If the treatment standard for a listed waste does not address the constituent causing the waste to exhibit the characteristic, both the listed waste and characteristic waste codes (and treatment standard) apply.

A F005 is also a D018 (benzene)

- D018 does not need to appear on the LDR form as the treatment standard for F005 will address the benzene (RO 14545). D018 is listed as a 'constituent of concern' in the F listing.

A F005 is also a D001.

- D001 does need to appear on the LDR form as the treatment standard for F005 does not address ignitability (RO 11877).



LDR Notification & Certification

Notification:

- If the waste or contaminated soil **does not meet** the applicable treatment standard, then, the generator shall send a **one-time written** notice to each treatment or storage facility receiving the waste with the **initial waste shipment**, and shall place a copy in the generator's file (s. 268.7(a)(2)).

Certification:

- If the waste or contaminated soil **meets** the applicable treatment standard, then, the generator shall send a **one-time written** notice to each treatment or storage facility receiving the waste with the **initial waste shipment**, and shall place a copy in the generator's file (s. 268.7(a)(3)) and the following certification statement, signed by an authorized representative.
 - *I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR 268 subpart D. I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.*



One Time Notification Under s. 268.7(a)(7)

If a generator determines that they are 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), the generator 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.**



Alternative LDR Standards for Soils

- There are 3 LDR options for managing hazardous waste soils:
 - Meet the LDR standards in s. 268.40.
 - Request a treatability variance under s. 268.44.
 - Use the alternative treatment standards under s. 268.49.
 - 90% reduction from initial concentration.
 - Requires two set of samples – before and after treatment.
 - Uses representative sampling to determine if 90% reduction has occurred.
 - 10 times universal treatment standards (UTS) – table in 268.40.
 - Requires only one set samples –after treatment.
 - EPA refers to this as “90% removal capped at 10-time UTS.”
- Facilities should be able to demonstrate and document how the alternative soil treatment standards have been met.
 - The rationale for arriving at a manageable list of monitoring constituents for the hazardous soil to be treated.
 - The rationale for sampling protocols or methodology for collecting representative
 - samples of hazardous constituents of concern in the contaminated soil (e.g., QAPP, sampling plan, and spatial analyses to delineate volumes of soil with constituent concentrations greater than 10 x UTS soils).
 - The methodology for determining attainment of the standard of 90-percent reduction or 10 x UTS.
 - Treatment data used to verify attainment of 90-percent reduction or 10 x UTS.



Alternative LDR Standards for Debris

Debris means solid material exceeding a 60 mm (~2.4") particle size that is intended for disposal and that is a manufactured object; or plant or animal matter; or natural geologic material (s. 268.2(g)).

There are 3 LDR options for managing hazardous waste debris:

- Meet the LDR standards in s. 268.40.
- Issue a no longer contains determination under s. 261.3(f)(2)
- Meet the alternative standards in s. 268.45. Examples:
 - Physical Extraction: abrasive blasting, scarification, grinding and planning, high pressure steam and water sprays.
 - Chemical Extraction or destruction: chemical or electrolytic oxidation, chemical reduction.
 - Thermal Extraction: high temperature metals recovery.
 - Biological Destruction: biodegradation of organic or nonmetallic inorganic compounds.
 - Thermal destruction: Treatment in an incinerator or BIF.
 - Immobilization: macroencapsulation, microencapsulation, sealing.
 - Residue from the treatment of hazardous debris is subject to the waste-specific treatment standards provided in 268.40.

LDRs and No Longer Contains Decision

- Contained-in policy is not codified – except for hazardous waste debris (s. 261.3(f)(2)).
- For listed hazardous waste, the contained-in decision is issued by the regulating authority.
- No longer contain determinations are based on risk assessment.
 - Note that LDR treatment standards are based on BDAT and not risk.
- Contaminated environmental media no longer contains a hazardous waste when:
 - soil that exhibit a characteristic of a hazardous waste are treated so they no longer exhibit a characteristic of a hazardous waste.
 - Soils that exhibit a characteristic of a hazardous waste at the POG (excavation) must meet the LDR treatment standard when land disposed.
 - concentrations of hazardous constituents from listed hazardous wastes are below health-based levels.
 - **Soils contaminated with a listed hazardous waste must meet the LDR treatment standard when land disposed unless the soil was contaminated before the LDR standards apply to the listed waste and a no longer contains determination (contained out) has been issued by the regulating authority at the POG (excavation).**
 - Table at s. 268.49(a).
 - Table 2 in appendix VII of part 268.
- Examples of no longer contain letters (RO 11948).



Putting it all Together



Characteristic Hazardous Waste Generated from a Gasoline Spill

- Excavated soil from historic surface spills of aviation gasoline at an airport exhibit the D008 and D018 characteristic.
- What do we need to know to determine what RCRA requirements must be met?

Review of the SDS for gasoline showed the following constituents that also appear in the UTS table s. 268.48.

SECTION 3: Composition/information on ingredients

| Chemical Name | CASRN | Concentration |
|----------------|------------|---------------|
| Gasoline | 86290-81-5 | >99.8 |
| Tetraethyllead | 78-00-2 | 0.13 |

Hazardous Constituent(s) Contained Within Above Complex Substance(s)

| Chemical Name | CASRN | Concentration |
|------------------------------|-----------|---------------|
| Xylenes (o-, m-, p- isomers) | 1330-20-7 | 1-15 |
| Toluene | 108-88-3 | 1-10 |
| Ethylbenzene | 100-41-4 | 1-5 |
| n-Hexane | 110-54-3 | <4 |
| Benzene | 71-43-2 | <0.5 |

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.



Characteristic Hazardous Waste Generated from a Gasoline Spill

1. Is contaminated environmental media being generated under RCRA? **Yes.**
2. When did spill occur? **1976.**
3. Is the spill a listed or characteristic hazardous waste? **Characteristic.**
4. Was representative sampling done for a characteristic waste determination? **Yes.**
5. Do any exclusions apply – like the petroleum exclusion? **None known.**
6. How is the soil to be disposed of after treatment? **Used on-site to build a screening berm.**
7. Can we get a variance from the LDR treatment standard? **Unlikely.**
8. Do the LDR treatment standards apply since land disposal is occurring? **Yes.**
9. Do the UHCs need to be determine? **Yes.**
10. Is treatment occurring on-site to meet the LDR treatment standards? **Yes.**
11. Is a RCRA permit needed? **No.**
12. What LDR treatment standard is being selected? **The alternative LDR standards for soils.**
13. Is an LDR notification and/or certification form needed? **Yes.**



Characteristic Hazardous Waste Generated from a Gasoline Spill

14. The table below shows a potential issue with benzene as its minimum treatment standard could cause it to fail TCLP.
15. The table below also shows an issue with lead as its minimum treatment standard fails TCLP.

Since the goal is use the soils to build a screening berm, the minimum LDR treatment standard for lead cannot be used as it would still cause the soils to be a D008 hazardous waste. Additionally, a TCLP testing needs to be conducted for benzene in order to determine if 200 mg/kg will fail TCLP (RO 14409).

| Constituent | Waste Codes | TCLP Value | Initial Concentration | UTS Concentration s.268.48 | 10 X UTS | 90% Removal | Minimum Treatment Standard |
|--|-------------|------------|-----------------------|-------------------------------|------------------|--------------------|----------------------------|
| Benzene (71-43-2) | D018 | .5 mg/l | 2,000 mg/kg | 10 mg/kg | 100 mg/kg | 200 mg/kg | 200 mg/kg |
| Ethylbenzene (100-41-4) | | | 1,500 mg/kg | 10 mg/kg | 100 mg/kg | 150 mg/kg | 150 mg/kg |
| Toluene (108-88-3) | | | 30,000 mg/kg | 10 mg/kg | 100 mg/kg | 3,000 mg/kg | 3,000 mg/kg |
| Xylene, mixed isomers (1330-20-7) | | | 600 mg/kg | 30 mg/kg | 300 mg/kg | 60 mg/kg | 300 mg/kg |
| Lead (439-92-1) | D008 | 5.0 mg/l | 40.0 mg/l | .75 mg/l | 7.5 mg/l | 4 mg/l | 7.5 mg/l |



Listed Hazardous Waste Generated from a Drycleaner Release

The site's goal is to bring the excavated soils and concrete debris to a subtitle D landfill for land disposal.

1. Site used to be a dry cleaner that stopped operations over 20 years ago.
2. Soils and the concrete floor are impacted with tetrachloroethylene (PCE), trichloroethylene (TCE), and vinyl chloride (VC).
3. 139 soil samples collected.
4. Site acknowledges that soils are impacted with a listed hazardous waste.
5. Site acknowledges that impacts to the soil occur mostly before and some likely after the effective LDR dates.
6. Site used Fenton's reagent to treat the soils in-situ and ex-situ.
7. Site used roll-off boxes to contain and treat the soils that are excavated.
8. Treatment occurred during the winter months resulting in one of the roll-off boxes being on site for 110 days before treatment could begin.



Listed Hazardous Waste Generated from a Drycleaner Release

Sampling results from soil treated ex-situ in roll-off box 1:

- TCE in mg/kg: 2, 2, 3, 4, and 5.
- PCE in mg/kg: 5, 8, 10, 15, and 35.
- VC in mg/kg: .02, .02, .03, .04, and .05.

Sampling results from soil treated ex-situ in roll-off box 2:

- TCE in mg/kg: 1, 3, 3, 5, and 7.
- PCE in mg/kg: 5, 10, 12, 20, and **140**.
- VC in mg/kg: .05, .05, .07, .08, and .08.

Based on the above sampling results and the table below can the soils in box 1 and 2 be issued and no longer contains determination and be land disposed?

| Constituent | Possible Waste Codes | LDR Effective Dates (Soils) | TCLP Value | Site Specific Cleanup Value | UTS Concentration s.268.48 | LDR 10x Value |
|----------------------------------|----------------------|--|----------------|-----------------------------|----------------------------|-----------------|
| Trichloroethylene (TCE) | F001 U228 D039 | 11/08/1988 08/08/1990 05/08/1992 | .7 mg/l | 8.81 mg/kg | 6 mg/kg | 60 mg/kg |
| Tetrachloroethylene (PCE) | F001 U210 D040 | 11/08/1988 08/08/1990 05/08/1992 | .5 mg/l | 153 mg/kg | 6 mg/kg | 60 mg/kg |
| Vinyl Chloride (VC) | D043 U043 | 12/19/1994 08/08/1990 | .2 mg/l | 2 mg/kg | 6 mg/kg | 60 mg/kg |



Resources

- Introduction Land Disposal Restrictions (40 CFR 268) (September 2005).
- LDR - Land Disposal Restrictions Summary of Requirements (2001).
- **Guidance on Demonstrating Compliance with the Land Disposal Restrictions (LDR) Alternative Soil Treatment Standards (EPA 530-R-02-003).**
 - Appendix A: Management of Remediation Waste Under RCRA.
- Use of the Area of Contamination (AOC) Concept During RCRA Cleanups (March 13, 1996).
- McCoy's RCRA Unraveled and Reference.



Takeaways

1. Understand when environmental media becomes subject to RCRA. If treatment can be done in-situ and a no longer contains determination can be issued prior to excavation, then RCRA does not become an issue.
2. Avoid overclassifying environmental media as a hazardous waste as this can increase cost and hinder cleanup from a regulatory perspective. Use the DQO process and ISM to help characterize the site not only for making a waste determination for characteristic waste but also for determining what the decision units will be.
3. Know that representative sampling is needed for making a characteristic waste determination and that grab sampling is almost always needed to determine if the LDR treatment standards are met.
4. Most ex-situ treatment can be done without a need for a RCRA permit; however, this requires planning and an understanding of the RCRA requirements. Make sure that the treatment to be conducted is appropriate to the season. For example, do not operate a wastewater treatment unit in the outdoors in the middle of Winter.
5. Understand that issuing a no longer contains determination for environmental media contaminated with a listed hazardous waste does not mean automatically mean that the environmental media can be land disposed. A review is still needed to determine if the LDR treatment standards still apply to the environmental media.
6. Use the alternative treatment standards for soil and debris as it lower costs and can increase the willingness of the RPs to conduct site cleanups.



We do not inherit the earth from our parents; we borrow it from our children.



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