

RCRA Compliance at Cleanup Sites: Waste Characterization & Listed Hazardous Waste

A NEWMOA Waste Site Cleanup Group
Webinar



October 24, 2019
10:00 - 11:30 a.m.

Remediation Waste Characterization: Applicable Laws & Regulations

- Hazardous Waste Regulations.
 - Federal.
 - State (vary from state to state).
- Solid Waste/Special Waste Regulations & Statutes.
 - Vary from state to state.
- Remediation Standard Regulations.
 - Most of the NEWMOA States have them.
 - 3 NEWMOA States license environmental professionals - (CT, MA, NJ).



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For example, Connecticut's Remediation Standard Regulations:

- Have requirements for the Use of Polluted Soil and Reuse of Treated Soil.
- Specify how soil excavated from and/or treated at a release area during remediation must be managed.

Topics for Today's Webinar

- Generator Responsibilities.
- Point of Generation.
- Hazardous Waste Determinations.
- Characteristic hazardous waste.
- Listed Hazardous Waste.
- “Contained-in” principle.
- Non-hazardous waste management requirements.
- Examples/Case Studies.
- Waste characterization as part of overall project management.



Responsibilities of the Generator



- Fully and properly characterize the waste.
 - Ultimately the responsibility of the generator.
 - Not the transporter, disposal facility, consultants, etc.
- If the waste is hazardous, manage it in accordance with all applicable hazardous waste requirements.
- “Co-generators” are jointly and severally liable for compliance with generator requirements.
 - Property owner or operator (e.g., lessee).
 - Remediation consultant (e.g., LSP, LEP, etc.).
 - Remediation contractor(s).

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- Joint and several liability means that EPA or a state could pursue enforcement against one or any combination of the co-generators for non-compliance.
- If a written agreement is in place that specifies that a particular co-generator is responsible for complying with generator requirements, enforcement agencies would typically pursue enforcement against that party first.

Point of Generation



- General Principle: A waste that is placed into storage or disposal prior to the effective date of RCRA is not a waste until it is removed from storage or disposal. As a result:
 - Environmental “media” that was contaminated with hazardous waste before the effective date of RCRA is not hazardous waste as long as it is in the ground.
 - Once media is removed from the ground (e.g., dug up or pumped out), it is “generated” and becomes a waste. If characteristic or listed, the media would be a hazardous waste.
 - In addition to media, this principle also applies to other wastes such as buried drums, abandoned tanks, sludge in surface impoundments, etc. (They are generated as wastes when removed from the ground.)

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- Note: the applicability of listings is retroactive. So, if a particular listing applies to a waste that was generated before that listing became effective, it becomes a hazardous waste meeting that listing at the point of generation. See 53 FR 31147, 53 FR 17586.
- Reason for the General Principle: EPA did not want RCRA requirements to apply retroactively to disposal or releases that occurred before the effective date of RCRA (would have affected tens of thousands of sites nationwide). However, other authorities (CERCLA, state remediation regulations) can be retroactive.
- On the other hand, EPA didn’t want to extend this to post-RCRA disposal or releases (would provide an incentive to dispose or release to avoid regulation).

Point of Generation (Cont.)



- This principle does not apply to environmental media that was contaminated with hazardous waste after the effective date of RCRA.
- “Effective date of RCRA” is 11/19/1980 for most wastes.
 - Could be later for wastes that were added to the definition of HW after 11/19/1980.
 - Example: TCLP VOCs and SVOCs (added 3/29/1990).
- Compliance with HW requirements must occur beginning at the point of generation.
 - Not when test results come back.

Hazardous Waste Determinations



- A generator must determine if a waste is HW. [40 CFR 262.11]
- This is required at the point of generation.
 - Is it a characteristically hazardous?
 - Is it a listed hazardous waste?
 - Is it a State-listed hazardous waste?
 - Which EPA waste codes apply?
 - Acute vs. non-acute hazardous waste.
- Can be performed by:
 - Testing, or
 - “Knowledge of Process” (must be valid).

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- “Knowledge of Process”: “knowledge of the hazard characteristic[s] of the waste in light of the materials or the processes used.” [40 CFR 262.11]
- Examples of KOP: MSDS sheets, product data sheets, product test data, purchasing records and other business records, safety records, employee interviews, and prior sampling (e.g., mass analysis results from environmental sampling using the “20 times” approach).

Hazardous Waste Determinations (Cont.)



- Process can (and should) also be used for LDR purposes (Underlying Hazardous Constituents).
- Handling “unknowns.”
 - Examples:
 - Unmarked drums or uncontained wastes found at a cleanup site.
 - Drums of drill cutting spoils, groundwater, etc. generated during site investigations.
 - If possible, characterize before the point of generation.
 - If not possible: containerize (if needed), sample, mark “HW Pending Analysis,” and manage as HW until results come back.

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- Example of an unknown that could be characterized before the point of generation: contents of an abandoned underground storage tank.
- Example of an unknown that would probably have to be characterized after the point of generation: monitoring well drill cuttings and well development wastewater.

Characteristic Hazardous Waste

- Characteristic Hazardous Waste - waste that is hazardous by virtue of a physical property that it exhibits:
 - Ignitability (D001): liquids with a flash point < 140, ignitable solids, ignitable compressed gases, DOT oxidizers.
 - Corrosivity (D002): pH \leq 2.0 or \geq 12.5.
 - Reactivity (D003): react with water, explosives, some cyanide and sulfide bearing wastes.
 - Toxicity (D004 - D043): fail TCLP test for one or more specific constituents:
 - These include 8 metals, 10 VOCs, 14 SVOCs, and 8 pesticides & herbicides.



Characteristic Hazardous Waste - Media



- Contaminated environmental media containing these wastes is only hazardous if it exhibits a characteristic (after the point of generation).
- “Media” = soil, groundwater, or sediment.
- Resources:
 - [Managing Remediation Waste Under RCRA](#) (EPA)
 - [HW Characteristics - A User-Friendly Reference Document](#) (EPA)
 - [RCRA Online](#) (EPA Database of Regulatory Interpretations EPA)
 - State Environmental Agency website HW pages.

Characteristic Hazardous Waste - Media



- Definition of Ignitability, Corrosivity, and Reactivity will often rule out media being HW:
 - Solid - liquid makes ignitability and corrosivity unlikely.
 - Does not exhibit the properties that make the waste hazardous.
 - Caution: even if not HW, may still be subject to LDRs.
- Most common characteristic for media is toxicity.
 - Must use TLCP (not SPLP).

Listed Hazardous Waste



- Listed Hazardous Waste - waste that meets a specific material/process definition or “listing.”
- Includes the following types of listed waste:
 - Wastes from non-specific sources (F-listed).
 - Wastes from specific sources (K-listed).
 - Commercial Chemical Product Wastes (U- and P-listed).
 - U-listed: not acute hazardous wastes.
 - P-listed: acute hazardous wastes.
 - State-specific listed wastes in some NEWMOA states (check state HW Regs).

Listed Hazardous Waste: Non-Specific Sources (F001 - F039)



- Listed Spent Solvents (F001 - F005).
 - Common examples: TCE, PCE, 1,1,1-TCA, MeCl₂, MEK, toluene, xylene.
- Metal Finishing Wastes (F006 - F019).
 - Common examples: WWT sludges, plating/stripping/quenching baths.
- Other F wastes not very common.
- Making F-listed determinations can be tricky.
 - Listing definitions are very specific (need to read them carefully).
 - Applicability of F001 - F005 listings to solvent blends.
 - Definition of “electroplating” in F006.

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- F001 listing applies only to certain “spent halogenated solvents used in degreasing.”
- F002 listing applies only to certain “spent halogenated solvents” (other than those used in degreasing and covered by F001).
- F006 listing only applies to sludges from wastewater treatment from certain specified processes. The F006 listing does not include plating baths or other wastes associated with electroplating. However, baths could fall under the F007 – F011 listings, and any of these wastes could be characteristic HW.

Listed Hazardous Waste: Specific Sources (K001 - K181)



- Industry, process and chemical-specific.
- Some of the more common K-listed wastes:
 - K061 steel mill flue dust.
 - K062 spent pickle liquor from steel finishing operations.
- The rest are not very common.
- Not as tricky as the F-listings (very specific).

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- Industries covered by K listings include wood preserving; the manufacture of inorganic pigments, organic chemicals, inorganic chemicals, pesticides, and explosives; petroleum refining; the iron and steel, primary aluminum, and secondary lead industries; the production of veterinary pharmaceuticals; ink formulation; and, coking.

Listed Hazardous Waste: Commercial Chemical Products



- Commercial Chemical Products (U- and P-listings):
 - Discarded commercial chemical products and manufacturing chemical intermediates in the U or P lists.
 - Spill & Container Residues of Commercial Chemical Products.
- Must be unused.
- Must be the commercially pure grade of the chemical, or a product which contains the chemical as the “sole active ingredient.”
- P-listed waste are acute hazardous wastes.

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Examples:

- Unused listed solvents: 1,1,1-TCA (U226), TCE (U228), PCE (U210), MeCl₂ (U080), MEK (U159), toluene (U220), xylene (U239).
- Pesticides/herbicides: Chlordane (U036), Endrin (P051), Heptachlor (P059), Lindane (U129), Methoxychlor (U247), Toxaphene (P123), 2,4-D (U240).

Listed Hazardous Waste: Contained-In Principle



- “Contained-in” Principle:
 - Contaminated environmental media that contains a listed HW is regulated as a listed hazardous waste (after the point of generation).
- Applies only to listed HW (not characteristic HW).
- Examples:
 - Soil contaminated with electroplating wastewater sludges (F006).
 - GW contaminated with spent PCE dry cleaning solvent (F002).
 - Sediment contaminated by a release from a tank of virgin xylene (U239).

Contained-In Principle - Importance of Date



- What if you don't know what the source of the contaminant was?
 - If, after good faith efforts to determine whether or not the source contaminant is listed, documentation is unavailable or is inconclusive, it is not necessary to assume that it is listed.
- What if you don't know when the contamination happened?
 - Similar approach.
 - If, after good faith efforts to determine date of contamination, you are unable to do so because documentation is unavailable or inconclusive, it is not necessary to assume that the contamination is listed.

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- Good faith efforts means you have to really try to find the answer.
- Example 1: you find PCE at a former dry cleaner site but there are no records of any spill – proper to assume it's F002 and/or U210.
- Example 2: you find ethyl benzene, toluene, and xylene at a former gasoline depot, but they never used solvents – proper to assume it's not F003 or F005 (likely came from the gasoline itself).

Resources for Determining Listed Waste Codes

- Manifest data.
 - Manifests could be obtained from the property owner or operator (e.g., lessee).
 - State or federal databases.
 - Caution: not all HW Codes may be listed on the manifest.
- State/federal agency inspection reports (HW, Water, Air).
- Company records, interviews of former employees.
- Site visit.
- Town records.
- EPA [Guidance Document](#) and [Web Page](#).



Hazardous Waste Exemptions Part 1



- Characteristic sludges, byproducts, and CCPs being reclaimed - 40 CFR 261.2(c)(3).
- “Fuel to fuel” exemption - 40 CFR 261.2(c)(2)(ii).
- Domestic sewer and point-source discharge exemptions (only applies to discharges subject to the CWA) - 40 CFR 261.4(a)(1) and (2).
- Household Hazardous Waste - 40 CFR 261.4(b)(1).
- Ash, etc. from combustion of fossil fuels - 40 CFR 261.4(b)(4).

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Note: The applicable federal regulation sections are listed above for reference purposes only. Be sure to also check the applicable state regulations for more stringent or broader-in-scope requirements.

Hazardous Waste Exemptions Part 2



- Petroleum contaminated media and debris from UST cleanups conducted pursuant to 40 CFR 280 - 40 CFR 261.4(b)10).
- Samples of waste, water, soil, or air (only applies during collection, transportation and sampling) - 40 CFR 261.4(d).
- Scrap metal (no liquids) - 261.6(a)(3)(ii).
- Empty Containers - 40 CFR 261.7.
 - (1) Remove liquids AND (2) < 3% by wt. (or 3 inches) of residue.
 - Different for acute hazardous wastes (must triple rinse).

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Note: The applicable federal regulation sections are listed above for reference purposes only. Be sure to also check the applicable state regulations for more stringent or broader-in-scope requirements.

Note re scrap metal: “no liquids” means no liquid scrap metals (e.g., elemental mercury) and no scrap metals containing significant amounts of liquids (e.g. equipment with used oil in them).

Hazardous Waste Exemptions Part 3



- Wastes reclaimed for significant amounts of precious metals (partial exemption) - 40 CFR 266.70.
- Hazardous wastes that are recycled (partial exemption) - 40 CFR 261.6(b) and (c).
 - Recycling does not automatically mean the waste is exempt!
- Wastes subject to special requirements:
 - Used Oil (includes “materials containing or otherwise contaminated with used oil”) - 40 CFR 279.
 - Universal Waste - 40 CFR 273:
 - Batteries, certain pesticides, mercury-containing equipment, fluorescent lamps, other state-specific wastes (e.g., used electronics in CT).

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Note: The applicable federal regulation sections are listed above for reference purposes only. Be sure to also check the applicable state regulations for more stringent or broader-in-scope requirements.

Solid Waste/Special Waste/Use as Fill



- Even if contaminated soil or sediment is not hazardous, it may still be regulated as a solid waste.
- Some states classify it as a “special waste.”
- Disposal facility may require a state permit. Examples:
 - Landfill.
 - Soil burner facility.
- State remediation standard regulations may apply.
- Use as fill may be restricted or may require approval by state.
- See [NEWMOA Soil Reuse web page](#) for state-specific information.

Other Contaminants to Be Aware of



- PCBs (regulated under TSCA and corresponding state regs).
- Asbestos (may be regulated under NESHAPs and/or state regs).
- Emerging contaminants (e.g., PFAS, etc.).

Examples/Case Studies



- 1) Soil contaminated with lead from a non-listed source at a concentration of 6.5 mg/l by TCLP.
- 2) Soil from the site of a dry cleaner that operated from 1957 to 1973 contaminated with PCE.
- 3) Groundwater from a monitoring well contaminated with virgin MEK from a 2005 tank spill.
- 4) Wood-block flooring from a metal fabricating company that did degreasing using chlorinated solvents.
- 5) Contaminated soil, piping, and tree stumps from a gasoline UST cleanup conducted under 40 CFR 280.

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- 1) D008 hazardous waste.
- 2) It's not a hazardous waste in the ground, but at the point of generation, it would be a F002 hazardous waste via the contained-in principle (assuming the PCE was used before being released). It would be U210, if the PCE was unused. It would be D039 if the source is neither F002 nor U210 and the concentration is > 0.7 mg/l. If the waste is F002 or U210, there is no need to add D039 to the list of waste codes.
- 3) U159 hazardous waste in the ground via the contained-in principle.
- 4) Don't know for sure. However, chlorinated solvent degreasing means that the floor blocks might contain F001 waste. As a result, you should test the floor prior to removal and disposal for F001 listed solvents, to detect and isolate any hot spots, and minimize the amount of material requiring disposal as HW.
- 5) These wastes could be hazardous due to contamination by gasoline (e.g., benzene, D018). However, they are eligible for the exemption from hazardous waste requirements for "contaminated media and debris" from UST cleanups conducted under 40 CFR 280 (or the state counterpart of these requirements).

More Examples



- 6) Tank bottoms from a gasoline UST last used in 1969.
- 7) Spent GAC from a GW pump-and-treat system used to clean up spilled virgin 1,1,1-TCA that is sent back to the GAC manufacturer to be “regenerated.”
- 8) Wastewater in an abandoned WWTU that contains hex chrome at 700 mg/l and is sent off-site for treatment.
- 9) MGP soils contaminated with various PAHs and benzene at 5.0 mg/l by TCLP (benzene TC limit is 0.5 mg/l).
- 10) Used PPE contaminated with listed waste.

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- 6) Likely to be ignitable HW (D001) and/or TCLP hazardous for benzene (D018) at the point of generation. You would need to test to find out. If it is hazardous, it's not eligible for UST media and debris exemption because it's neither media nor debris. However, if it can be sent for fuel-blending, it would be exempt under the “fuel-to-fuel” exemption.
- 7) The date of the release doesn't matter because the groundwater has been removed from the ground. The applicability of the “contained in” principle to the contaminated groundwater carries through to the spent GAC, so it is a listed hazardous waste (U226). The spent GAC is not exempt due to recycling (e.g., as a characteristic sludge being reclaimed). EPA has said that the regeneration of spent GAC is considered disposal – not recycling – because the VOCs that are driven off are incinerated.
- 8) Chromium exceeds the TCLP limit of 5.0 mg/l so it is a D007 waste. The wastewater is not exempt under any of the CWA exemptions under RCRA because the wastewater is not treated and discharged to the city sewer or via a NPDES point source discharge.
- 9) Benzene exceeds the TCLP limit of 0.5 mg/l, which would make it a D018 hazardous waste. As long as the PAHs do not include any of the SVOCs on the TCLP list, they would not be an issue. However, if the state the site is in has adopted a 3/13/2002 EPA rule vacating the applicability of the TCLP to MGP waste, the waste would be non-hazardous.
- 10) They are listed hazardous waste under the contained-in principle. If disposed of, they

would be listed hazardous waste. If they can be cleaned and reused, they would not be a waste (never mind a hazardous waste). However, cleaning could produce residues that are hazardous.

Waste Characterization Should Be an Integral Part of Site-Wide Project Management

- It's tempting to focus on cleanup and worry about characterization later.
- Allows Law of Unintended Consequences to kick in:
 - Enforcement actions/penalties.
 - Unexpected need for approvals/permits.
 - Unnecessary delays and cost overruns.
- Opportunities to minimize disposal cost can be missed:
 - Timing of "Contained-in" determinations.
 - Contaminated soil management and staging.
 - In-situ vs. ex-situ treatment.
- Consider including a RCRA expert in the project design.
 - In-house.
 - Contracted out.



Future NEWMOA Training on Remediation Waste Management



- Original in-person training provided earlier this year in CT, MA, NH.
 - Available on [NEWMOA website](#).
- This is webinar #1 of 4 to provide more detailed training.
- Remaining webinars will address:
 - “Area of Contamination” and “Contained-In” policies (11/13/2019).
 - Waste piles (TBD).
 - Waste treatment and Land Disposal Restrictions (TBD).
- Other ideas? Let us know!

Questions?



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