TWO MINUTE TRAINING

TO: *CH2M HILL PLATEAU REMEDIATION COMPANY*

FROM: *PAUL W. MARTIN, RCRA Subject Matter Expert*
CHPRC Environmental Protection, Hanford, WA

SUBJECT: *RADIOACTIVELY CONTAMINATED LEAD-ACID BATTERIES AND HAZARDOUS DEBRIS*

DATE: *MARCH 8, 2018*

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TWO MINUTE TRAINING

SUBJECT: Radioactively Contaminated Lead-Acid Batteries and Hazardous Debris

Q: Some recent Two Minute Trainings (2MTs) have been focusing on spent lead-acid batteries for secondary containment and accumulation. But let's cut to the chase and talk about disposal of radioactive lead-acid batteries. How are drained radioactively contaminated lead-acid batteries managed in terms of hazardous waste disposal, i.e., the Land Disposal Restrictions (LDR)?

A: Lead-acid batteries have two inherent strikes against them in terms of disposal as either hazardous debris under 40 CFR 268.45 or as hazardous waste under 40 CFR 268.40. First, the drained lead-acid batteries are still considered nonempty RCRA containers due to the lead plates and if the batteries are intact and mixed with debris, the intact lead-acid batteries would have to be removed from the debris managed under 40 CFR 268.45 standards. Secondly, the lead-acid batteries have a specified technology treatment standard of thermal recovery of lead in secondary smelters (RLEAD); or if radioactively contaminated, a specified technology treatment standard for radioactive lead solids of macroencapsulation (MACRO). Per an EPA memo dated August 9, 2001 (RO 14554), the Department of Energy (DOE) asked EPA which LDR treatment standard should be applied to radioactively contaminated lead-acid batteries: the LDR treatment standard that requires lead recovery (which is not appropriate for batteries that are radioactively contaminated), or the LDR treatment standard for radioactive lead solids (shielding and other forms of elemental lead) that requires macroencapsulation (MACRO) per 40 CFR 268.42. In the memo EPA stated:

"We agree with you that the appropriate treatment standard is macroencapsulation. This treatment standard applies not only to lead shielding, but to other elemental forms of lead. Thus, there is latitude in the treatment standard to permit its application to radioactive lead-acid batteries. We also believe that macroencapsulation is appropriate because it would require less worker handling than lead recovery, and we want to minimize worker exposure to radioactivity. Furthermore, lead recovery of these batteries would radioactively contaminate the entire mass of lead that was recovered, making it unusable."

Also note that MACRO-encapsulation for radioactive lead solids as defined at 40 CFR 268.42 is slightly, but significantly different from macroencapsulation for hazardous debris as defined at 40 CFR 268.45. The major difference between the two definitions is that MACRO-encapsulation under 268.42 specifically does not allow macroencapsulation by using tanks or containers as defined at 40 CFR 260.10, whereas macroencapsulation under 268.45 does allow macroencapsulation by using tanks or containers, e.g., waste can be placed in a suitable container or tank, welded closed and considered macroencapsulated.

Therefore, a mixture of debris and drained radioactively contaminated lead-acid batteries could be MACRO-encapsulated as defined at 268.42 to meet the LDR treatment standards for radioactive lead solids and for debris. However, the MACRO-encapsulation would have to be in the form of surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Tanks or containers could not be used since this MACRO-encapsulation does not include the option for using containers or tank in the same way that is allowed for macroencapsulation as specified in 268.45.

SUMMARY:

- A mixture of debris and drained radioactively contaminated lead-acid batteries could be MACRO-encapsulated as radioactive lead solids per 40 CFR 268.42 to meet LDR treatment standards for both the batteries and the debris.
- The 268.42 and 268.45 definitions of macroencapsulation are slightly different and per 40 CFR 268.42 a tank or container cannot be used to macroencapsulate radioactively contaminated lead-acid batteries.
- If the mixture of debris and batteries is MACRO-encapsulated via surface coatings or inert jackets, the LDR treatment standards for both radioactive lead solids and debris are met.

Excerpts from 40 CFR 260.10, 268.40, 268.42 and 268.45 are attached. If you have any questions, please contact me at Paul_W_Martin@rl.gov or at (509) 376-6620.

FROM: Paul W. Martin **DATE:** 3/8/18 **FILE:** 2MT\2018\030818.rtf

TWO MINUTE TRAINING - ATTACHMENT

SUBJECT: Radioactively Contaminated Lead-Acid Batteries and Hazardous Debris

40 CFR 260.10 Definitions.

Container means any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled.

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.

40 CFR 268.40 Applicability of treatment standards / Treatment Standards for Hazardous Wastes

Regulated hazardous constituent				Wastewaters	Nonwastewaters
Waste Code	Waste Description and treatment/Regulatory Subcategory	Common Name	CAS#	Concentration in mg/L; or Technology Code	Concentration in mg/kg unless noted as "mg/L TCLP" or Technology Code
D008	Wastes that exhibit, or are expected to exhibit, the characteristic of toxicity for lead based on the toxicity characteristic leaching procedure (TCLP) in SW846.	Lead	7439-92-1	0.69 and meet §268.48 standards	0.75 mg/L TCLP and meet §268.48 standards
	Lead Acid Batteries Subcategory (Note: This standard only applies to lead acid batteries that are identified as RCRA hazardous wastes and that are not excluded elsewhere from regulation under the land disposal restrictions of 40 CFR 268 or exempted under other EPA regulations (see 40 CFR 266.80). This subcategory consists of nonwastewaters only.)			NA	RLEAD *[Thermal recovery of lead in secondary lead smelters.]*
	Radioactive Lead Solids Subcategory (Note: These lead solids include, but are not limited to, all forms of lead shielding and other elemental forms of lead. These lead solids do not include treatment residuals such as hydroxide sludges, other wastewater treatment residuals, or incinerator ashes that can undergo conventional pozzolanic stabilization, nor do they include organo-lead materials that can be incinerated and stabilized as ash. This subcategory consists of Nonwastewaters only.)			NA	MACRO

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40 CFR 268.42 Treatment standards expressed as specified technologies

MACRO: Macroencapsulation with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media.

Macroencapsulation specifically **does not include** any material that would be classified as a tank or container according to 40 CFR 260.10.

RLEAD: Thermal recovery of lead in secondary lead smelters.

40 CFR 268.45 Treatment standards for hazardous debris / Table 1.--Alternative Treatment Standards For Hazardous Debris

Technology description C. Immobilization	Performance and/or design and operating standard	Contaminant restrictions
1. Macroencapsulation: Application of surface coating materials such as polymeric organics (e.g., resins and plastics) or use of a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media.	Encapsulating materialist completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).	None.

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SUBJECT: Radioactively Contaminated Lead-Acid Batteries and Hazardous Debris

Andy Lawrence, Director
Office of Environmental Policy and Guidance
Department of Energy
Washington, DC 20585

Dear Mr. Lawrence:

Thank you for your letter dated May 24, 2001 requesting clarification of the Land Disposal Restrictions (LDR) treatment standard for discarded radioactive contaminated lead acid batteries. As you know, the LDR treatment standard must be met before hazardous waste may be land disposed. There are three subcategories under the LDR treatment standard for lead: numerical treatment standards are required for general wastes exhibiting the lead toxicity characteristic (TC); lead recovery (i.e., smelting) is required for lead acid batteries; and macroencapsulation is required for radioactive lead shielding and other elemental forms of lead.

You explained that several Department of Energy facilities manage drained, lead acid batteries which are radioactively contaminated. These batteries display the TC for lead. You asked whether you should apply the LDR treatment standard that requires lead recovery, or the one that requires macroencapsulation of radioactive lead shielding and other forms of elemental lead.

We agree with you that the appropriate treatment standard is macroencapsulation. This treatment standard applies not only to lead shielding, but to other elemental forms of lead. Thus, there is latitude in the treatment standard to permit its application to radioactive lead acid batteries. We also believe that macroencapsulation is appropriate because it would require less worker handling than lead recovery, and we want to minimize worker exposure to radioactivity. Furthermore, lead recovery of these batteries would radioactively contaminate the entire mass of lead that was recovered, making it unusable.

I hope you find this information helpful. Do not hesitate to contact me if you have questions.

Sincerely,

Elizabeth A. Cotsworth, Director
Office of Solid Waste

RO 14554