TWO MINUTE TRAINING

TO: *CENTRAL PLATEAU CLEANUP COMPANY*

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

SUBJECT: ***MACRO****ENCAPSULATION AND A JACKET OF INERT INORGANIC MATERIALS*

DATE: *JULY 14, 2022*

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TWO MINUTE TRAINING

SUBJECT: **MACRO**encapsulation and a Jacket of Inert Inorganic Materials

Q: The definition of macroencapsulation (MACRO) at 40 CFR 268.42 includes "*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*." Concerning the phrase "a jacket of inert inorganic materials", what is the basis for this phrase and what is an example of a jacket of inert inorganic material that meets the technology-based standard of macroencapsulation, i.e., MACRO?

A: EPA clarified in a letter dated December 27, 1990 (RO 13437), that the technology-based land disposal restrictions (LDR) treatment standard of MACRO at 40 CFR 268.42, explicitly prohibits containerization of wastes or materials in a tank or container. Note that the container/tank prohibition is specific to MACRO under 40 CFR 268.42 and does not apply to macroencapsulation of hazardous debris under 40 CFR 268.45, i.e., a stainless-steel drum could be used to macroencapsulate hazardous debris.

This same EPA letter addressed a situation where the U.S. Naval Nuclear Propulsion Program wanted to land dispose of defueled submarine reactor compartments. EPA stated:

"The information provided by the Navy indicated that the 'Jacket of inert inorganic materials' (i.e., the steel surrounding the lead) could 'substantially reduce surface exposure to potential leaching media' and that due to their size and structure these compartments would not be classified as a tank or container according to the definitions in 40 CFR 260.10. EPA purposely modified the proposed standard for D008 radioactive lead solids (MACRO) *to include 'Jackets of inorganic materials' in order to specifically account for these submarine reactor compartments. EPA felt that it was necessary to add the language to the definition of macroencapsulation to prevent the 'jacket of inorganic material' from being interpreted as including materials that are merely containers or drums."*

Therefore the basis for the phrase "a jacket of inert inorganic material" concerned land disposal of U.S. Navy defueled submarine reactor compartments. The steel hull surrounding the lead remaining in the reactor compartment, is an example of a jacket of inert inorganic material that substantially reduces surface exposure to potential leaching media. And who can argue with that?

SUMMARY:

- The definition of MACRO at 40 CFR 268.42 includes the phrase, "with a jacket of inert inorganic materials" and a prohibition on using containers or tanks to achieve macroencapsulation.
- EPA added the prohibition to prevent containers from being defined as inert inorganic jackets.
- The U.S. Navy's defueled submarine reactor compartments are examples of achieving the 40 CFR 268.42 MACRO treatment standard via a jacket of inert inorganic material.

The December 27, 1990, EPA letter is attached to the e-mail. If you have any questions, please contact me at Paul_W_Martin@rl.gov or at (509) 376-6620.

SUBJECT: **MACRO**encapsulation and a Jacket of Inert Inorganic Materials

9554.1990(14) DEC 27, 1990

TREATMENT STANDARDS FOR CERTAIN MIXED RADIOACTIVE WASTES

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE

Mr. Kevin S. Dunn, Project Manager
Environmental Policy Center
Law Companies Environmental Group
1828 L Street, N.W., Suite 711
Washington, D.C. 20036

Dear Mr. Dunn:

This letter is in response to your letter dated November 16, 1990, requesting clarification on certain issues regarding treatment standards for certain mixed radioactive wastes.

With regards to Question 1 (as referred to in your letter), "placement in a heavy stainless-steel box and welding the box closed" would not be considered to comply with the standard identified as "MACRO" in 268.42 Table 1 (55 FR 22693, June 1, 1990). This standard is quite clearly described in regulatory language in Table 1 as "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" (emphasis added). Paraphrasing the regulatory language, compliance with the macroencapsulation standard explicitly prohibits containerization of wastes or materials in a tank or container meeting the regulatory criteria under the 40 CFR 260.10.

This is not the same situation as here the U.S. Naval Nuclear Propulsion Program wanted to land dispose defueled submarine reactor compartments. The information provided by the Navy indicated that the "Jacket of inert inorganic materials" (i.e., the steel surrounding the lead) could "substantially reduce surface exposure to potential leaching media" and that due to their size and structure these compartments would not be classified as a tank or container according to the definitions in 40 CFR 260.10. EPA purposely modified the proposed standard for D008 radioactive lead solids to include "Jackets of inorganic materials" in order to specifically account for these submarine reactor compartments. EPA felt that it was necessary to add the language to the definition of macroencapsulation to prevent the "jacket of inorganic material" from being interpreted as including materials that are merely containers or drums.

With regards to the plastic coated, lead lined gloves in Question 2 of your letter, they would be considered to comply with the standard identified as "MACRO" provided that none of the lead is exposed (i.e., the entire surface of the lead is coated) and provided that the coating provides a substantial reduction in surface exposure to potential leaching media (i.e., the gloves should not be expected to be exposed to physical, chemical, or thermal conditions where the integrity of the surface coating could likely be breached). With regards to the lead weights in Question 2, the wastes may be considered to meet the specified method of "MACRO", as generated, provided the stainless steel surrounding the lead weights does not meet the definition of a tank or container and provided substantial reduction in surface exposure to potential leaching media can be determined.

The standard identified as "MACRO" currently applies only to D008 wastes fitting the description of "Radioactive Lead Solids" as defined in Table 3 of 268.42 (55 FR 22700, (June 1, 1990)) (e.g., those wastes containing elemental lead forms of lead or that act specifically as radioactive shielding). This standard is currently not applicable to the D006 wastes referred to in Question 3. These D006 wastes would have to comply with the concentration-based standard for D006 which is based on a TCLP analysis. Verification of compliance with this standard would require crushing or grinding of the material and compliance cannot be achieved by dilution. Thus, macroencapsulation processes would not comply with existing BDAT standards for metals.

TWO MINUTE TRAINING - ATTACHMENT

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Other than a treatability variance your D006 waste may be macroencapsulated if a no-migration petition is granted. As of today, EPA had only granted a two-year capacity variance for mixed wastes from the statutory deadline prohibiting the disposal of mixed wastes scheduled in the First, Second, and Third Third wastes. Previous capacity variances issued for mixed wastes scheduled in the Solvent and Dioxin Rule and the California List Wastes Rule had expired and thus, these mixed wastes are banned from land disposal units unless they meet the promulgated treatment standards.

I trust this letter addresses all your concerns and clarifies any outstanding issues you may have had on the applicability of the treatment standard identified as "MACRO". If you need further clarification, please contact Richard Kinch, Chief of the Waste Treatment Branch, at (703) 308-8434.

Sincerely,

Sylvia K. Lowrance
Director
Office of Solid Waste RO 13437

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