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Guidelines for the Segregation, Characterization, and Management of Dry Waste at Berkeley Lab

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GUIDELINES

FOR THE

* SEGREGATION

* CHARACTERIZATION

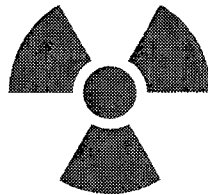
* MANAGEMENT

OF

DRY WASTE

AT

BERKELEY LAB



May 1997

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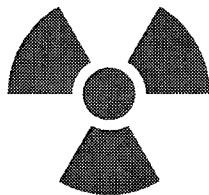
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Introduction

Managing and disposing of dry low level radioactive waste at Berkeley Lab is problematic. The Waste Management Group must assure off site treatment, storage, and disposal facilities that dry waste from Berkeley Lab is free of liquids and regulated metals (such as lead and mercury). RTR (Real Time Radiography) used for waste verification has shown that these items are sometimes present and can cause our waste to be rejected. This pamphlet helps to clarify dry waste management requirements that will ensure that Berkeley Lab dry waste will be accepted for off site shipment. These issues are critical if we are to have an off site disposal option for your dry radioactive waste.

WE NEED YOUR HELP! All information in this pamphlet is important and we hope that you will read it to gain an understanding of what items cause our dry waste to be rejected.

Definition of Dry Waste

Dry waste is defined as solid low level radioactive waste that is not hazardous and contains no free liquid. Dry waste is further subdivided in compactable and noncompactable categories to facilitate its management.

Approximately 30% of the routine low level radioactive waste generated at Berkeley Lab is dry waste. Most dry waste is generated from incidental contact with radioactive materials and typically contains solid constituents such as paper, plastic, glass, rubber, cloth, wood, or small (< 10 cm) pieces of metal. Dry waste may contain empty containers (see below) with residual chemical materials if the containers meet the definition of empty and did not previously contain extremely or acutely hazardous materials.

Dry Waste Prohibited Items In general, dry waste cannot contain:

- Free liquids of any type in any amount (e.g., scintillation vials must be empty)
- Regulated metals, particularly lead and mercury (e.g., no lead pigs, no lead shielding, no lead bricks, no traces of metallic mercury, no light bulbs or batteries, no printed circuit boards)
- Hazardous chemicals at concentrations that would cause the waste to have a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity)
- Hazardous chemicals that would cause the waste to be regulated for the constituent or combination of constituents in California or Washington, including chemical components that are P-Listed (refer to Table B-2 in the Appendices of PUB-3092)
- Etiologic agents
- Chelating agents at a concentration greater than 1% by weight

The 'Big Three' Criteria for Dry Waste Acceptance

In order for Berkeley Lab dry waste to be accepted by off site treatment, storage, and disposal facilities such as Hanford, it must meet three types of criteria:

1. Physical
2. Radiological
3. Chemical

Physical Criteria

- Material must contain no free liquid (i.e., scintillation vials, pipettes, and other containers must be empty).
- Waste must not be saturated with liquid (i.e., dry waste must be dry to the touch; this may require confirmation by a paint filter test, similar to putting waste in a coffee filter and confirming that it does not drip).

Radiological Criteria

Based on DOE orders and Hanford Waste Acceptance Criteria, low level dry waste must have the following radiological characteristics:

- Beta and gamma activities for bulk contaminated solids $< 0.3 \text{ mCi/g}$ ($< 0.005 \text{ mCi/g}$ for Sr-90)
- Alpha activities $< 100 \text{ nCi/g}$
- Activities from surface contamination $< 0.001 \text{ mCi/cm}^2$

Chemical Criteria

Chemical contamination in dry waste must be below regulatory limits for hazardous wastes in California and Washington. See PUB-3092, *Guidelines for Generators to Meet HWHF Acceptance Requirements for Hazardous Waste at Berkeley Lab*, for general information on hazardous waste management.

During the course of experiments, solid materials such as paper, gloves, or laboratory equipment may become contaminated with hazardous solvents that could cause a hazardous designation, even in very small quantities. Such waste might require management as mixed waste due to either a hazardous characteristic or a listing. The following policy will apply to characterization of dry waste that may have come into contact with regulated solvents:

- If dry waste becomes contaminated with a solvent used for its intended purpose during the course of a process or experiment, a listing will not be assigned to the dry waste.
- If dry waste becomes contaminated with a spent solvent that is a listed waste, the Waste Management Group will assign a listing to the dry waste, regardless of solvent concentration. For example, if a listed spent solvent is spilled while being poured into a waste container, the material used to clean up the spill must be managed as mixed waste.

In general, a hazardous listing will not apply to contamination by process solvents during their intended use, but the listing will be applied if the dry waste is contaminated with a listed solvent during any waste management activities after the solvent has been declared a waste. This includes waste management activity that may occur either at the generator accumulation area or at the Hazardous Waste Handling Facility.

D-Code Wastes: If a dry waste is contaminated with a material that is regulated for a characteristic (usually toxicity), it is important to know the concentration of the contaminant in order to determine if the waste must be managed as mixed waste. Under Federal regulations, certain materials can impart a toxic characteristic to a waste mixture. These materials are commonly referred to as D-code wastes. The most common D-code chemicals of concern at Berkeley Lab and the concentration limits that would trigger a hazardous designation are listed below:

<u>Regulated Metals</u>	<u>Concentration (mg/kg or ppm)</u>
Arsenic	100
Barium	2000
Cadmium	2
Chromium	100
Lead	100
Mercury	4
Selenium	20
Silver	100

<u>Regulated Solvents</u>	<u>Concentration (mg/kg or ppm)</u>
Benzene	10
Carbon tetrachloride	10
Chloroform	120
1,2,- Dichloroethane	10
Methyl ethyl ketone	4000
Pyridine	100
Tetrachloroethylene	14
Trichloroethylene	10

Do not add dry waste that exceeds the above limits to your uncontaminated or less contaminated dry waste to reduce the total concentration of the contaminant. This practice is construed as impermissible dilution and is a violation of both Federal and state hazardous waste regulations.

CAUTION: Hazardous materials that are not regulated under Federal regulation may still cause a dry waste to be regulated in California or in Washington (or other states where the waste may be sent for treatment and/or disposal). Dry waste generators should be aware of all potentially hazardous materials that might impart a hazardous characteristic or listing to their wastes. If you are unsure whether the materials in your dry waste might impart a hazardous designation, please contact your Generator Assistance Specialist for further guidance.

Guidelines for Dry Waste Management

I. Dry Waste Characterization and Labeling

When you begin to accumulate dry waste in your laboratory:

- Please use a standard yellow 2 ft³ can (or other container provided by EH&S) to accumulate dry waste
- The primary container for compactable dry wastes should be a cement sack (Stores Item 8105-27692) inside a 24" x 30" polyethylene bag (Stores Item #8105-47512).
- Attach a Radioactive Waste Tag to each dry waste can when you begin to accumulate waste and fill out sections A, F, and G. If you are concerned that the Radioactive Waste Tag will become contaminated while adding waste to your container, you may post the Rad Tag near the container, but the Rad Tag must be keyed by number to the container.
- Each can should have stickers attached to remind generators of the type of waste (e.g., P-32 dry waste) in the can, the prohibited items in dry waste (sticker supplied by EH&S) and the waste stream number from the process flow diagrams for your research (supplied by EH&S).
- Accumulation logs can help you remember what has been placed in a dry waste can. In general, however, you are not required to keep an accumulation log for dry wastes generated at Berkeley Lab.

II. Segregation of Dry Waste

Each year, your Generator Assistance Specialist confers with you about your experimental processes that generate radioactive wastes and how these wastes should be segregated in your Radioactive Waste Accumulation area. Using this input, the EH&S Waste Minimization Team produces experimental descriptions and process flow diagrams for each of your routine low level waste generating processes. These materials comprise the Appendices to Berkeley Lab's *Low Level Radioactive and Mixed Waste Reduction Plan* and provide a basis for discussions of possible source reduction strategies for your low level radioactive waste.

Hanford requires that compactable dry waste be composed predominantly of compactable materials. Large (> 10 cm) pieces of noncompactable materials such as wood or equipment must be accumulated separately from compactable dry waste to meet this requirement and to allow for the possibility of decontamination at the HWHF for reuse or recycling.

In order to minimize wastes and reduce the costs of radioactive waste management at Berkeley Lab, dry waste should be segregated according to: **category and half-life** of the isotope. Whenever possible, please use separate and clearly labeled collection containers for waste segregation by category and half-life, as follows:

- Half-life < 30 days (e.g., P-32, for decay-in-place at the HWHF)
- Half-life > 30 days and < 90 days (e.g., S-35 and I-125, for decay-in-place at the HWHF)
- Beta emitters with a half-life > 90 days (e.g., H-3 and C-14)
- Induced (activated) radioactivity only
- Actinides and others

For example, dry waste contaminated with tritium should be accumulated separately from containers holding dry waste contaminated with short-lived isotopes or actinides. If space limitations or other considerations make it difficult to segregate your dry waste as indicated above, please contact your Generator Assistance Specialist to develop a more suitable segregation scheme.

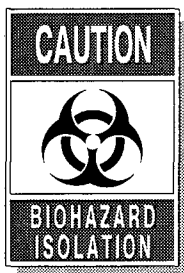
III. Placing Empty Containers in Dry Waste Cans

Radioactively contaminated containers that previously held hazardous materials are generally not considered to be mixed waste when they are empty. These include bottles, test tubes, centrifuge tubes, pipettes, pipette tips, and other similar items. Empty containers that previously held acutely hazardous materials (spent P-listed materials such as potassium cyanide and various pesticides) or extremely hazardous materials (such as certain arsenic and beryllium salts) are considered to be hazardous themselves and must be managed as hazardous waste. Please consult Tables B2 and C in the Appendices to PUB-3092 for complete lists of acutely and extremely hazardous materials.

Under Federal hazardous waste regulations, a container that did not previously hold an acutely or extremely hazardous material is considered empty when **both** of the following criteria are met:

- All material has been removed using the practices usually employed to remove the material from the container (e.g., pouring, aspirating, pipetting).
- No more than 3 percent by weight of the total capacity of the container remains in the container.

For radioactively contaminated containers that meet the above definition of empty, the residual chemical in the container is not regulated and the containers can be managed as dry waste. If a container previously held an acutely or extremely hazardous material, that container can be rendered empty only by triple rinsing. Because Berkeley Lab generators are not currently authorized to perform triple rinsing activities, such containers must be managed as mixed waste.



IV. Radioactive Sharps Containers

Sharps materials have acute rigid corners, edges and protuberances that are capable of cutting or piercing the skin, such as razor blades, scalpels, needles, broken glass or Pasteur pipettes. Sharps that are radioactively contaminated must be packaged in such a way that personnel who may subsequently handle the wastes are not exposed to potential injury. Please manage your radioactive sharps as follows:

- Place radioactive sharps in a sturdy, rigid container (e.g., cardboard ice cream container or sharps container).
- Seal the container prior to placing it in a dry waste barrel, segregated by half-life of isotope or other category.
- Radioactive sharps **must not be placed** in a Medical Waste Collection Barrel.

V. Waste Pickup Procedure

When you are ready for the Waste Management Group to pick up your dry waste:

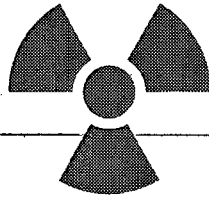
- Seal the bag with 2-inch duct tape.
- Record the size of the collection can.
- Use the full container size and relative amount of the waste to estimate the actual waste volume.
- Record all constituents in the Dry Waste on the Radioactive Waste Tag. There should be one line for each radioactive isotope and one line for each chemical constituent (both hazardous and nonhazardous). Each entry must be accompanied by an acronym (DIRT, MB, Rx, or DA), indicating the basis for the knowledge of the concentration of that constituent.
- Give your best estimate of wt % for chemical constituents and μCi for radioactive constituents.
- Estimate the proportion of various physical components (paper, plastic, rubber, glass, wood, metal, etc.) to the nearest 10%.
- Fax your Tag and any supporting information to x4838.
- Tie and tape the Radioactive Waste Tag and supporting information to the neck of the waste bag.

THE RADIOACTIVE WASTE TAG MUST BE COMPLETELY FILLED OUT PRIOR TO WASTE PROCESSING.

You should contact your Generator Assistance Specialist if:

- You are having difficulty appropriately labeling the quantity and concentration of chemicals on the Radioactive Waste Tag.
- You are unsure of the classification and threshold limits of toxic waste contamination. (regulations for California, Washington, and other states differ)
- You have additional questions about the segregation, characterization, or management of your dry waste.

Dry Waste Stickers should be placed on the outer surface of STORAGE CONTAINERS for dry waste. Dry Waste Stickers are available from your EH&S Generator Assistance Specialist.



This Dry Waste May Be Shipped to Hanford!

Please do not put the following items in this can:

- **Free liquids of any type in any amount**
- **Regulated metals, particularly lead and mercury**
 - ◆ **No lead pigs!**
 - ◆ **No lead shielding!**
 - ◆ **No lead bricks!**
 - ◆ **No light bulbs!**
 - ◆ **No batteries!**
 - ◆ **No printed circuit boards!**
 - ◆ **No traces of metallic mercury!**
- **Hazardous chemicals at concentrations that cause the waste to be ignitable, corrosive, reactive, or toxic**
- **Etiologic agents such as human pathogens**
- **Chelating agents at concentrations greater than 1%**

Dry wastes going to Hanford can not contain toxic chemicals at concentrations sufficient to give the waste a hazardous designation in California or Washington. For further information, contact your Generator Assistance Specialist.

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