

XVIII. MATERIAL DISPOSAL

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LASL HEALTH and SAFETY MANUAL, CHAPTER,
XVIII - MATERIAL DISPOSAL.

A. INTRODUCTION

It is the policy of the Los Alamos Scientific Laboratory to manage all waste materials in a manner which minimizes adverse effects to man and his environment and to minimize the generation of such waste materials. Waste materials, particularly those having hazardous or toxic properties, require packaging, handling, and disposal or storage according to applicable Federal, state, and local regulations. The H-7 Waste Management Group has the responsibility at LASL for most waste disposal. Disposal procedures are identified in the following sections:

B. RADIOACTIVE SOLID WASTE

1. Policy and Procedures

Director's Office Memorandum No. 48 "Radioactive Solid Waste Management Policy" establishes the policy for disposal and storage of solid radioactive wastes. ERDA Manual Chapter 0511 states the policy and criteria with regard to the management of ERDA-generated radioactive waste that are binding upon LASL. The following is a summary of the requirements of this Manual Chapter:

- a. Technical and administrative efforts should be directed toward:
 - A reduction in the volume of radioactive solid waste generated.
 - A reduction in the amount of radioactivity in such waste.
- b. Volume reduction technology, such as compaction and incineration, shall be adapted for radioactive solid waste wherever practical.
- c. ERDA-generated solid waste contaminated with transuranic isotopes at an activity concentration greater than ten nanocuries per gram (10 nCi/g) shall receive special handling. Transuranic isotopes include ^{233}U (with its daughter isotopes), plutonium and transplutonium isotopes other than ^{238}Pu and ^{241}Pu . ^{238}Pu and ^{241}Pu contaminated wastes are to be included when so indicated by ^{239}Pu impurities (>10 nCi/g), or when required by local policy. (The LASL has established with ERDA concurrence a policy that ^{238}Pu waste at

activity concentrations above 100 nCi/g shall receive the special handling indicated). Special handling requirements for this waste include the following:

- It shall be segregated from other radioactively contaminated solid waste
- Combustible and noncombustible transuranic wastes shall be packaged separately
- It shall be packaged and stored under conditions permitting retrievability in intact, contamination-free condition after 20 years in storage
- The waste package shall be labeled so that the waste contained in it can be identified by cross reference to permanent records.

- d. Waste materials contaminated with transuranic isotopes at activity concentrations below 10 nCi/g (below 100 nCi/g for ^{238}Pu) will continue to be handled as in the past.

2. Responsibilities at LASL for Radioactive Solid Waste Management

Radioactive waste management operations including solid waste burial and retrievable storage are the responsibility of Group H-7 at TA-50-1, MS 518, Ext. 4301.

Questions concerning radioactive solid waste disposal and special waste disposal problems should be directed to the Solid Waste Disposal Section of Group H-7, at TA-50-37, MS 517, Ext. 7391.

Arrangement for routine disposal/storage of radioactive solid waste, assistance with routine waste management operations, reporting requirements, etc., should be directed to H-7 Waste Management personnel located at the LASL radioactive solid waste disposal/storage area: TA-54, Area G, MS 592, Ext. 6095.

3. Establishment of Standard Operating Procedures

The Laboratory Policy calls for the establishment of Standard Operating Procedures (SOP) in the implementation of the Policy, such procedures to be established by the Laboratory unit having the operational responsibility. These procedures should include all steps from the generation of the waste, segregation procedures, types of containers, methods of shipment, and procedures for special problems. The

Memorandum "LASL Operation Group Waste Management SOP's" H8-WM-242) dated 8/2/74 should be referenced with regards to details of writing such SOP's.

4. Categories of Solid Residues

Four categories of solid residues have been identified on the basis of their actual or potential content of radioactive materials:

- a. Type 1 waste materials, for which there is assurance that no radioactive materials or harmful chemicals are present, are taken by the Zia Company to the sanitary landfill operated by Los Alamos County.
- b. Type 2 wastes, which are judged to be contaminated with radioactive isotopes other than the transuranics, and/or with transuranic activity concentrations less than 10 nCi/g (100 nCi/g for ^{238}Pu), do not require storage for later retrieval. These wastes are buried in the LASL burial ground at Mesita del Buey (TA-54).
- c. Type 3 wastes, which are judged to be contaminated with transuranic elements to levels greater than 10 nCi/g (100 nCi/g for ^{238}Pu), require retrievable storage.
 - The volume of waste over which the 10 nCi/g can be averaged is taken to be the volume of waste package (container) in which a measurement or estimate is made.
 - Procedures shall be established for the segregations of small batches of waste material so that the retrievable portions can be handled separately.
 - Highly contaminated wastes shall not be deliberately diluted to circumvent this criterion.
- d. Type 4 residues contaminated with radionuclides in amounts in excess of the recovery limits are not considered to be wastes and require recycling for recovery.

5. Waste Packaging

- a. Solid radioactive waste disposed of nonretrievably

All radioactive solid wastes which are to be disposed of nonretrievably shall be provided with appropriate packaging by the originator.

- Room-type trash should be packaged in cardboard boxes and/or plastic bags. Compactible waste is to be packaged separately from noncompactible waste. Each package to be identified as "compactible" or "non-compactible."
- Transuranic contaminated chemical treatment sludge, that is <math><10 \text{ nCi/g}</math> (<math><100 \text{ nCi/g } ^{238}\text{Pu}</math>) should be packaged in a minimum .127 mm (5 mil) plastic bag, sealed in a 210-liter (55 gallon) approved fiber or metal drum.
- Larger and/or heavier wastes require more substantial packaging such as wooden crates. The H-7 Solid Waste Disposal Section can advise with regard to packaging this type of waste.
- In those instances where all contamination is fully contained within the waste material, no additional packaging may be required. The Solid Waste Disposal Section should be consulted in this matter.
- Radioactive waste oils require absorption in an approved manner with packaging in a sealed metal container. Reference H-7 memorandum "Disposal of Radioactive Contaminated Oils at the LASL" (H7-SW-530) for approved procedures in packaging such oils (Appendix A)
- Tritium contaminated wastes containing "significant" quantities of tritium require special packaging in asphalt coated and sealed metal containers. Wastes with "significant" quantities of tritium are defined as any item, apparatus, equipment, etc. used as a part of a tritium handling or containment system. Contact H-7 Waste Management personnel at 7391 for specific packaging and other disposal instructions for such wastes. Normal room trash from a tritium work area, while treated as being contaminated, may be packaged in cardboard boxes and/or plastic bags as previously described.

b. Solid transuranic waste stored retrievably

- Dry wastes should be packaged by the originator in white painted 210-liter DOT 17C (55-gallon) drums containing minimum 0.25 mm (10 mil) thick polyethylene liner. The only drum acceptable is the LASL stock drum #LG 1115.

- Corrosive, wet, or other problem wastes require packaging in a 2.29 mm (90 mil) high density crosslinked polyethylene liner in the above identified drum. This liner is LASL stock #LG 3738.
- Transuranic waste oils require adsorption and packaging in the 2.29 mm polyethylene liner in the above identified drum. Reference H-7 memorandum "Disposal of Radioactive Contaminated Oils at the LASL" (H7-SW-530) for approved procedures in packaging such waste oils. (Appendix A)
- Retrievable transuranic waste items too large to be packaged in the 210-liter drum require packaging in a Group H-7 approved wooden crate coated with fiber glass. Group H-7 memorandum "Packaging Retrievable TRU-Wastes in Wooden Crates" (H7-SW-676) gives specifications for a 4' X 4' x 8' crate that can be constructed at LASL. Since then a fiber glass coated 4' X 4' X 7' crate has been obtained and is available as a stock item; the stock number is LG-562. Plastic and cardboard liners come with this crate and are included with its cost. These liners are required to be used with this crate. Generally, the stock item crate will be considerably less expensive than the LASL-constructed crate.

6. Radioactive Waste Package Labeling

All packages of radioactive solid waste destined for disposal or storage must be clearly labeled as containing radioactive material. Tape and signs appropriate for this purpose are obtainable through LASL Safety Stock. These include:

a. Cardboard Boxes and Bags

"CAUTION RADIOACTIVE WASTE" tape (Stock Number CM-3263/8G-38) should be used to mark all boxes and bags of waste to be disposed of by burial.

b. Drums

All drums containing waste, whether designated for burial or retrievable storage should have attached a "RADIOACTIVE MATERIAL" tag (Form 743) properly filled out.

c. Wooden Crates

Crates that contain radioactive waste (retrievable or nonretrievable) must have attached a 15.2 cm by 15.2 cm (6" X 6") aluminum tag, properly filled out. These tags can be obtained through LASL Safety Stock or from H-7 Solid Waste Disposal Section.

d. Retrievable Packages

All retrievable transuranic solid waste packages are to have a serially numbered identification tag permanently attached. These tags will be provided by the H-7 Solid Waste Disposal Section. The tag number for each package is to be recorded as the reference to the permanent records for that package.

7. Records Requirements for Radioactive Solid Waste

In order for the H-7 Solid Waste Disposal Section to maintain the required records for waste disposal, a LASL Radioactive Solid Waste Disposal Record Form is required with each waste item or shipment, as indicated:

a. Buried Waste

For radioactive solid wastes to be disposed of non-retrievably, a properly completed Disposal Form must accompany each consignment.

b. Stored Waste

For transuranic solid waste to be stored retrievably, a properly completed Disposal Form must accompany each package.

Waste will not be disposed of without a properly completed form accompanying the waste or having been already received at the disposal site.

Disposal of a property-numbered (PN) item or a classified contaminated item also requires a properly completed and signed C and D Form (252-R, Disposal of Contaminated and/or Classified Property). Group SP-2 initiates these forms. The C & D Form may be obtained from the SP-2 Group Office.

8. Special Waste Lots

Special lots of materials are defined as those which contain unusual levels or types of radioactive and/or chemical contaminants. Such wastes shall require special notification and handling. When such materials are encountered, the following information should be forwarded to the H-7 Solid Waste Disposal Section in the form of a memo which will serve as a part of the record:

- a. Number, size and nature of containers
- b. Waste matrix materials in each container
- c. Identity and quantity of each radioisotope in each container
- c. Copy of authorization, by responsible organization, to dispose as waste by burial/storage.

The Solid Waste Disposal Section will review the information, assure any special review and requirements for criticality safety and/or retrievable storage, assess the storage or disposal method to assure that safety will be maintained, and then implement disposal.

C. RADIOACTIVE LIQUID WASTE

1. Policy and Procedures

a. General

It is LASL policy to collect and treat all radioactive liquid wastes at central processing plants. ERDAM Appendix 0510, the General Manager's Memorandum on Effluent Reduction (Dec. 26, 1974) and the LASL Director's Office Memorandum 38 require that all radioactive effluents be limited to the lowest levels technically and economically practical. Thus all operations generating radioactive liquid waste should be periodically reviewed to insure that a minimum volume of waste as well as a minimum quantity of radioactivity is being released.

b. LASL Sites Served by the Industrial (Acid) Sewers

The TA-50 treatment plant collects liquid wastes via the industrial (acid) sewer system from TA-3, TA-35,

TA-48, TA-50, TA-52, and TA-55. Sources in TA-3 include SM-16, SM-28, SM-29, SM-32, SM-34, SM-39, SM-40, SM-65, SM-66, SM-102, SM-141, SM-154, SM-184, and SM-216. The TA-21-257 plant collects liquid wastes via the industrial (acid) sewer at TA-21. Sources in TA-21 include Buildings 2, 3, 4, 5, and 150 at DP West, and Buildings 152, 155, and 209 at DP East. Questions about which particular laboratories or sinks at the above sites are served by the industrial (acid) sewers should be directed to Group H-1 or to Group H-7. Plans for labeling all such points of discharge are being implemented.

Quantities of radionuclides of less than 50 microcuries (μCi) may be discarded to the sinks connected to the industrial (acid) sewers described above. For quantities greater than 50 μCi , arrangements for disposal should be made by contacting Group H-7 Liquid Waste Management personnel at Ext. 4301.

c. Sites Served by Hauling

Sites which generate radioactive liquid wastes but are not served by the industrial (acid) sewer include TA-2, TA-43, TA-53, and TA-54. Wastes from these sites are regularly collected in Dempster tanks, drums or smaller containers for transport to the treatment plants.

2. Responsibilities for Radioactive Liquid Waste Management

Radioactive Liquid Wastes at the LASL are the responsibility of Group H-7.

Questions concerning radioactive liquid waste disposal practices, special liquid waste disposal problems or arrangements for routine radioactive liquid disposal or pick-up of containers with radioactive liquids should be directed to the Liquid Waste Engineering Section of Group H-7, TA-50-1, MS-518, Ext. 4301.

3. Establishment of Standard Operating Procedures (SOP)

It may be necessary for the operating group to establish a written Standard Operating Procedure (SOP) for the management of radioactive liquid wastes. The criterion for whether an SOP is needed is listed in Director's Office Memorandum 32, Revision 1. The SOP must be approved by Groups H-1 and H-7.

4. Packaging, Labeling and Identification

Quantities of radioactive liquids which are collected for pickup by H-7 and total less than 20 l must be placed in H-7 approved containers with screw-type top openings and no bottom valves. When over 20 l of radioactive liquid waste is accumulated, it must be packaged in H-7 approved drums again with no bottom valves.

All containers must be clearly labeled and an H-7 Batch Waste Form completed before pick-up (the forms may be obtained by phoning Ext. 4301).

D. NONRADIOACTIVE CHEMICAL AND OTHER WASTE

All nonradioactive chemical waste at the LASL (with some exceptions as noted later) require proper disposal at the Laboratory chemical waste disposal area, Area L, TA-54 (Mesita del Buey). Operation of this area is the responsibility of the Solid Waste Disposal Section of the H-7 Waste Management Group.

1. Responsibility

The Laboratory operating group which generates the chemical waste is responsible for properly preparing the material and arranging for its disposal. The H-7 Waste Management Group is responsible for the disposal. The Laboratory H-3 Safety Group and H-5 Industrial Hygiene Group have the responsibility for keeping all Laboratory operating Groups (including H-7 Waste Management) informed of potential problems associated with the handling, storage, and disposal of hazardous and/or toxic chemicals and chemically contaminated wastes. Prior to each disposal, the H-3 Safety Group must ascertain the nature of the material and provide H-7 Waste Management with this information.

2. Preparation of Wastes for Disposal

Packaging and labeling of waste chemicals is the responsibility of the Laboratory user. Whenever possible, chemical containers should be labeled to identify contents and age of the material. No other materials shall be included in packages other than material required for packaging of the chemicals.

The H-7 Solid Waste Disposal Section, Ext. 7391, MS-517 should be contacted to arrange disposal of chemical wastes. They, in turn, will advise the H-3 Safety Group, and arrange pick-up and disposal.

a. Waste Chemicals

All waste chemicals for disposal should be packaged separately according to their properties. Specific categories are: (1) Reactive Metals; (2) Organics; (3) Acids/Bases; (4) Inorganics; (5) Special. For safety purposes, categories of waste chemicals require disposal into a separate burial facility.

Waste chemicals included in the "Special" category are the materials defined in b through g below plus others which are suspected as being particularly hazardous because of chemical properties, age, or chemical breakdown, or which are completely unidentifiable.

Properly segregated and packaged waste chemicals should be stored in cabinets marked "WASTE CHEMICALS" when such cabinets are available. All groups generating chemical wastes on a regular basis are requested to provide such cabinets. The H-3 Safety Group can provide additional information regarding these cabinets.

All waste chemicals must be adequately packaged for handling and transportation. For most small containers of chemical wastes, the preferred packaging involves the placement of individual chemical containers into cardboard boxes, the boxes having a plastic liner of at least 5 mil thickness. Such boxes shall be no larger than 0.1 m³ (3.5 ft³) and shall weigh no more than 15 kg (33 lbs) when filled. Boxes should be filled in a manner to prevent breakage of the chemical containers. Use of an inert material such as vermiculite, Sorball, or other such material in and around individual chemical containers is recommended, particularly for liquids.

The H-7 Waste Management Group (Ext. 7391) and/or H-3 Safety Group (Ext. 4644) should be contacted for instructions for the handling and/or packaging of all "Special" chemicals.

b. Cyanides

Cyanides, both in solid and liquid form, and their containers are not to be disposed of at Area L and must be packaged separately for H-7 pick up and disposal. Packaging is as described above. Contact H-7 at Ext. 4301 for disposal instructions.

c. Beryllium

Beryllium and its compounds require disposal at an approved LASL hazardous waste disposal site. For disposal of beryllium wastes, the H-5 Industrial Hygiene Group (Ext. 5231) should be contacted first. Pick-up for disposal then will be accomplished by Group H-5 and/or H-7 Waste Management.

d. Mercury

Mercury and mercury-containing compounds require disposal at an approved LASL hazardous waste disposal site. Separate packaging from other chemicals is required.

- Elemental mercury

Mercury (nonradioactive) can be returned for recovery by contacting the H-1 Decontamination Section at TA-50, Ext. 5420.

Mercury batteries should be packaged individually in paper or other non-conductor and sent to LASL Salvage, SM-142.

- Mercury-containing compounds

Contact H-7 Waste Management for disposal of mercury-containing compounds and their containers.

e. Cancer Suspect Agents and Chemicals Identified as Carcinogens

Handling and disposal of all cancer suspect agents and materials identified (by H-5 Industrial Hygiene) as carcinogens is strictly governed either by Federal regulations or special requirements defined by H-5. The H-5 Industrial Hygiene Group can advise regarding these requirements. Laboratory groups intending to work with such materials are required to have, prior to the initiation of work, an SOP approved by H-Division covering the handling and disposal of these materials.

f. Radioactive Classified, High Explosive (HE) Wastes

No radioactive, classified, or HE contaminated wastes may be disposed of at Area L; these materials must be segregated and handled separately. For disposal of classified radioactive or chemical wastes, SP-2 Group

also must be contacted. Contact the WX-Division Office (Ext. 4136) or H-3 Safety Office (Ext. 4644) for disposal of all HE-contaminated waste materials.

g. Gases Under Pressure

Nonradioactive gases contained in cylinders will be disposed of by the H-7 Waste Management Group with necessary assistance provided by the H-3 Safety Group and H-5 Industrial Hygiene Group. Group H-7 should be contacted; they will arrange for pick up and disposal.

Laboratory groups intending to work with large quantities of toxic or hazardous gases, or with any quantity of extremely toxic gases, are required to have, prior to the initiation of work, an SOP approved by H Division covering the handling and disposal of these material(s). Guidance regarding such SOP's can be obtained from the H-5 Industrial Hygiene Group and H-3 Safety Group.

h. Polychlorinated Biphenyls (PCB s) and PCB-contaminated solid waste

Present Federal regulations require the proper disposal of all PCB containing wastes to minimize release of PCB s into the environment (REF. "Polychlorinated Biphenyl-Containing Wastes-Disposal Procedures, Federal Register, April 1, 1976). The Solid Waste Disposal Section of the H-7 Waste Management Group should be contacted to arrange for the disposal of all PCB wastes.

At LASL, PCB oils are used in power transformers, and in some capacitors in the Laboratory electrical system and in R & D areas. Consequently, prior to any work with such oil-containing, electrical system components, it should be determined if the oil is a PCB. Contact H-5 Industrial Hygiene or H-7 Waste Management for any needed assistance in identifying PCB materials.

- PCB Oil

Waste PCB oil that does not contain any solid material, requires packaging, and storage for eventual shipment to Monsanto for incineration. All such waste PCB oil should be collected in a leak-free metal container that can be securely sealed. Contact H-7 Waste Management Personnel at Ext. 7391 for assistance and pickup of this material.

- PCB-containing solid wastes

All solid wastes contaminated with PCBs require disposal at the LASL Chemical Waste Disposal Area. Such wastes must not be disposed of at the County operated landfill.

Whenever possible, PCB-contaminated solid wastes should be packaged for disposal in leak-free metal containers that can be securely sealed. Metal drums, 115 liter or 210 liter size with a minimum 10 mil plastic liner are preferable packagings. Vermiculite should be added around the waste any time leakage of PCB oil from the waste is possible. Contact H-7 Waste Management at Ext. 7391 for assistance and to arrange disposal.

- PCB-containing capacitors

When not ruptured or leaking, PCB-containing capacitors may be disposed of without any additional packaging. Capacitors that have ruptured and are leaking require packaging for containment of the PCB oil. All such capacitors must be shorted out prior to disposal.

Whenever possible, leaking capacitors should be packaged in a leak-free metal container that can be securely sealed. Vermiculite should be added around the waste to absorb any free PCB oil that might be leaking. When too large for packaging in a metal container, leaking PCB-containing capacitors should be securely wrapped in plastic to contain any free PCB oil. Contact H-7 Waste Management at Ext. 7391 for assistance and to arrange disposal.

i. Non PCB containing Capacitors

Arrangements for disposal of non-PCB containing capacitors can be made through H-7 Waste Management. Operating groups wanting disposal of capacitors must assure that the capacitors are shorted out after receiving approval from H-7. The generating group must make necessary arrangements with Zia for delivery of large size capacitors to Area L or other H-7 Group approved location.

Equipment items that are evaluated as having nonremovable, nonradioactive chemical contamination require

disposal at Area L (or other approved location); H-7 Waste Management will coordinate such disposals. For items too large for one person to handle, assistance from the generating group or a work order to Zia will be required for disposal.

j. Other

For disposal of any questionable nonradioactive chemical wastes, contact the H-3 Safety Group, H-5 Industrial Hygiene Group and the H-7 Waste Management Group for assistance.

3. Chemical Disposal Requests

For all disposals of nonradioactive chemicals or chemically contaminated waste, information is required by H-7 Waste Management to assure the proper disposal of the waste. This information includes:

- Origin of Waste - Person to contact
- Location of Waste - TA, Bldg., Wing, Room, etc.
- Description of Waste - include any known, suspected or potential problems with the handling of disposal of the waste.
- Amount of Waste.

Chemical Disposal request forms which can be used to provide such information to the H-7 Waste Management Group may be obtained by phoning H-7 personnel at Ext. 7391.