Lawrence Berkeley Laboratory

UNIVERSITY OF CALIFORNIA

ENVIRONMENT, HEALTH AND SAFETY DIVISION

**Low-Level Waste Certification Plan
for the Lawrence Berkeley Laboratory
Hazardous Waste Handling Facility**

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Low-Level Waste Certification Plan
for the Lawrence Berkeley Laboratory
Hazardous Waste Handling Facility

Revision 1
Effective Date: January 10, 1995

Environment, Health and Safety Division
Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

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**Low-Level Waste Certification Plan for the LBL
Hazardous Waste Handling Facility**

**PUB-5353
Revision 1
Effective Date: January 10, 1995**

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1. Introduction

1.1 Purpose

The purpose of this plan is to describe the organization and methodology for the certification of low-level radioactive waste (LLW) handled in the Hazardous Waste Handling Facility (HWHF) at Lawrence Berkeley Laboratory (LBL). This plan is composed to meet the requirements found in the Westinghouse Hanford Company (WHC) Solid Waste Acceptance Criteria (WAC) [1] and follows the suggested outline provided by WHC in the letter of April 26, 1990, to Dr. R. H. Thomas, Occupational Health Division, LBL. LLW is to be transferred to the WHC Hanford Site Central Waste Complex and Burial Grounds in Hanford, Washington.

The plan also incorporates the applicable elements of waste reduction, which include both up-front minimization and end-product treatment to reduce the volume and toxicity of the waste; segregation of the waste as it applies to certification; a summary of the Waste Management Quality Assurance (QA) Plan [2] for the HWHF (Section 4); and a list of the current and planned implementing procedures used in waste certification (Appendix A).

This plan provides guidance from the HWHF to waste handlers and the Waste Certification Specialist to enable them to conduct their activities and carry out their responsibilities in a manner that complies with the requirements of WHC-WAC. It also provides guidance to waste generators through the *Guidelines for Generators of Hazardous Chemical Waste at LBL* and *Guidelines for Generators of Radioactive and Mixed Waste at LBL* [3] (hereinafter called the *Guidelines for Generators*). These Guidelines incorporate all minimization, characterization, separation, segregation, labeling, and packaging requirements applying to generators of LLW. Waste generators have the primary responsibility for the proper characterization of LLW. The Waste Certification Specialist verifies and certifies that LBL LLW is characterized, handled, and shipped in accordance with the requirements of WHC-WAC.

Certification is the governing process by which LBL personnel conduct their waste generating and waste handling activities in such a manner that the Waste Certification Specialist can verify that the requirements of WHC-WAC are met.

Continued on next page.

1. Introduction (continued)

1.2 Scope

This LLW Certification Plan applies to low-level waste that is generated at LBL and becomes the responsibility of the HWHF. LLW is defined in Appendix B of this document, in WHC-WAC, and in Department of Energy (DOE) Order 5820.2A [4]. LLW that also contains dangerous waste as defined in the Washington State *Dangerous Waste Regulations*, 173-303-040 (18) [5] is considered to be mixed waste and is addressed in the *Mixed Waste Certification Plan* [6]. The certification process for transuranic (TRU) waste is addressed by the *Transuranic Waste Certification Plan* [7].

1.3 Facility Description

1.3.1 Overall Description

LBL is located in the Oakland-Berkeley hills, adjacent to the Berkeley campus of the University of California. Figure 1-1 is a map of the Laboratory and surrounding area. LBL is a multipurpose national scientific laboratory, whose mission is to conduct forefront scientific research in several areas related to energy sciences, general sciences, and life sciences.

These research activities result in the generation of radioactive and hazardous wastes, as well as mixed waste.

1.3.2 Hazardous Waste Handling Facility

Hazardous waste, radioactive waste, and mixed waste are stored, packaged, and prepared for offsite transport at the HWHF. The HWHF is a Resource Conservation and Recovery Act (RCRA) facility and consists of several indoor and outdoor handling and storage areas. Activities performed at the HWHF consist primarily of consolidation, storage, and packaging of the waste for safe removal and transportation to a permanent offsite disposal facility. LBL has no waste disposal facilities. Figure 1-2 is the LBL site plan, showing the location of the HWHF. Figure 1-3 is a site plan of the HWHF, showing the location of the waste handling and storage areas.

Continued on next page.

1. Introduction (continued)

Figure 1-1

Location of LBL in relation to its surroundings

Continued on next page.

1. Introduction (continued)

Figure 1-2

LBL site map, showing location of the HWHF

Continued on next page.

1. Introduction (continued)

Figure 1-3

HWHF site plan

Continued on next page.

1. Introduction (continued)

1.3.2 (continued) LLW is managed at LBL in accordance with applicable U.S. DOE, U.S. Environmental Protection Agency (EPA), State of California, and Washington State regulations and is packaged and transported to the WHC disposal/storage site in accordance with U.S. Department of Transportation (DOT) regulations.

WHC determines whether each request for storage or disposal of LLW meets its requirements, and prepares and issues a Storage/Disposal Approval Record (SDAR).

A new HWHF is currently under construction. The new facility will consolidate separate waste-handling operations in one modern facility with enhanced safety and waste-containment functions. A Part B Permit Application was approved by the California Department of Toxic Substances Control to cover operations at the new facility and to close the existing one.

1.4 Facility Waste Management Strategy

The Environment, Health and Safety Division (EH&S) is responsible for the preparation of the *Waste Management Plan* [8], which governs treatment, storage, and shipment of LLW. Individual generators are responsible for the characterization of wastes, including LLW, in accordance with procedures established by EH&S.

1.4.1 References

The LBL Waste Management Program meets the applicable guidance of the following:

- DOE Order 5820.2A, *Radioactive Waste Management*
- Code of Federal Regulations (CFR), Title 40 [9]
- Code of Federal Regulations (CFR), Title 49 [10]
- Washington State, *Dangerous Waste Regulations*, Washington Administrative Code, Chapter 173-303, latest revision
- California Code of Regulations Title 22 [11]
- *Hanford Site Radioactive Solid Waste Acceptance Criteria* (WHC-EP-0063), latest revision

Continued on next page.

1. Introduction (continued)

-
- 1.4.1 (continued) The Waste Management Program at LBL is implemented through the following documents, in addition to this LLW Certification Plan:
- LBL Health and Safety Manual, LBL PUB-3000 [12]
  - *Certification Plan, Mixed Waste, Hazardous Waste Handling Facility*, LBL PUB-5354, latest revision
  - *Certification Plan, Transuranic Waste, Hazardous Waste Handling Facility*, LBL PUB-5355, latest revision
  - *Hazardous Waste Certification Plan, Hazardous Waste Handling Facility*, LBL PUB-5356, latest revision [13]
  - Waste Management procedures (listed in Appendix A)
  - *Waste Management Plan*
  - *Waste Management Function Notebook and Hazardous Waste Handling Facility Facility Notebook* [14]
  - *Guidelines for Generators of Hazardous Chemical Waste at LBL and Guidelines for Generators of Radioactive and Mixed Waste at LBL*, LBL PUB-3092, latest revision
  - *Waste Minimization and Pollution Prevention Awareness Plan* [15]
  - *Waste Management Quality Assurance Plan*, latest revision
  - *Guidelines for Waste Accumulation Areas (WAAs) at LBL*, LBL PUB-3093, latest revision [16]
  - *Medical and Biohazardous Waste Generator's Guide*, LBL PUB-3095, latest revision [17]

Continued on next page.

1. Introduction (continued)

1.4.2

Summary of Waste Minimization, Segregation, Certification, Packaging, and Shipping Activities

Minimization

The *Waste Minimization and Pollution Prevention Awareness Plan* provides the policy, strategy, objectives, and goals for waste minimization at LBL.

Segregation

Segregation activities include specific separation and storage instructions contained in the *Guidelines for Generators* and detailed in specific waste stream procedures, as listed in Appendix A. Actions currently practiced at LBL to achieve waste segregation include

- handling radioactive wastes separately from all other wastes
- using good housekeeping in hoods, glove boxes, and laboratories
- accumulating radioactive wastes in separate, labeled, specially designated containers (e.g., ice cream cartons or waste sacks in garbage cans)
- transporting radioactive wastes separately from other types of waste
- storing radioactive waste in separate areas at the HWHF
- keeping sharp objects (e.g., hypodermic needles, scalpels) in separate protective containers.

Certification

This LLW Certification Plan is established by the HWHF to demonstrate compliance with WHC-WAC for LLW. The processes for identifying, packaging, labeling, marking, and documenting LLW are identified in Section 3 of this LLW Certification Plan.

LBL requires all waste generators to attend training courses that support the detailed implementation of waste handling, sampling, and analysis activities sufficient to assure certification. The *Guidelines for Generators* has also been issued for use.

Continued on next page.

1. Introduction (continued)

1.4.2 (continued)

Packaging

Waste packaging criteria are identified in Section 3.17 for each waste stream. LBL practices for packaging of LLW include

- packaging noncompactable waste separately
- keeping sharp objects (hypodermic needles, scalpels) in separate protective containers
- inspecting shipping containers upon receipt to assure that the containers are in acceptable condition and properly marked, and after packaging to assure marking, labeling, and closure are adequate, according to quality control (QC) inspection procedures
- conducting inspection or surveillance during packaging operations to assure that the waste acceptance criteria are being met.

Shipping

Shipping requirements are identified in Section 3.19. LBL shipping practices include

- transporting LLW separately in containers that meet all applicable regulations
- inspecting all shipping containers for integrity and proper marking and labeling
- inspecting the loaded vehicle to ensure that it is properly blocked and braced, properly placarded, and meets dose-rate and contamination limits
- complying with DOT radioactive materials transportation regulations (49 CFR) and WHC-WAC.

Continued on next page.

1. Introduction (continued)

1.4.3 Waste Disposal QA Oversight Summary

A summary of the Waste Management QA Plan requirements for LLW certification is presented in Section 4. The following are some important requirements of the Waste Management QA Plan.

- Regular inspections of the HWHF and the stored waste are performed by EH&S personnel.
- Internal audits are conducted by LBL's Office of Assessment and Assurance on a two- or three-year basis.
- DOE external audits are done periodically.
- Functional audits of the Waste Management program by each of the other EH&S Departments (Health, Safety) are done at least annually, depending on the findings of previous audits. The following groups provide annual functional audits of the Waste Management Program:
  - *Health Department:* Industrial Hygiene Group, Radiation Assessment Group
  - *Safety Department:* Occupational Safety Group, Fire Department's Prevention Unit (the Fire Department is part of the Safety Department)
- Waste disposal personnel periodically review waste packaging, storage, and disposal requirements, including those stated in WHC-WAC and other governing documents.
- Waste disposal personnel review all documentation and applicable DOE orders on a regular basis.

Continued on next page.

1. Introduction (continued)

1.5

LLW Generation

LLW is generated by many divisions at LBL. These include the Materials Sciences, Chemical Sciences, Accelerator and Fusion Research, Energy and Environment, Structural Biology, and Life Sciences divisions. Currently the LLW streams are identified, based on the following forms and characteristics:

- Solid compacted, consisting of dry laboratory wastes (plastic, rubber, paper, glass, and wood shavings) contaminated with long-lived radioisotopes
  - Solid noncompacted (drums), consisting of large solid contaminated objects
  - Solid noncompacted (wooden boxes), consisting of solid contaminated items too large to fit in a 55-gallon drum
  - Induced metals, consisting of nonhazardous metal waste made radioactive by bombardment with neutrons or charged particles produced by LBL accelerators
  - Animal carcasses, consisting of animal carcasses or tissues contaminated with radioisotopes
  - Absorbed tritium, consisting of HTO absorbed onto silica gel
  - Solidified liquid, consisting of research laboratory solutions solidified with portland cement and diatomaceous earth.
-

2. Organization and Responsibilities

2.1 Description of Facility Organization

The Environment Department of the Environment, Health, and Safety Division (EH&S) has the responsibility for management of LLW at LBL. Within the Environment Department, the Radioactive/Mixed Waste Operations Unit is responsible for handling and shipping LLW. Figure 2-1 shows the Environment Department organization, and Figure 2-2 shows the organizational flow for these wastes.

Figure 2-1

Environment Department Organization Chart

Continued on next page.

2. Organization and Responsibilities (continued)

Figure 2-2

Organizational Flow for Low-Level Waste

2.2 Duties and Responsibilities

This section lists positions responsible for the management and handling of LLW, with the responsibilities for each job title. Quality assurance (QA) responsibilities are listed where relevant. Additional responsibilities are listed in Section 4, *Quality Assurance*.

2.2.1 Division Director, Environment, Health and Safety Division

- Has overall responsibility for environment, health, and safety issues at LBL.
- Assures the resources necessary to conduct HWHF operations in a safe manner.

2.2.2 Head, Environment Department

- Has overall responsibility for implementation of the Waste Management QA Plan at the HWHF.
- Reviews and approves the Waste Management QA Plan and revisions.

Continued on next page.

2. Organization and Responsibilities (continued)

2.2.3 Waste Management Group Leader

- Is responsible for directing and monitoring all HWHF operations.
- Is responsible for directing and monitoring the implementation of the HWHF QA program.
- Reviews and approves this LLW Certification Plan.
- Reviews and approves the Waste Management procedures.
- Assures that waste handling operations are conducted in accordance with the requirements of WHC-WAC.
- Assures that the procedures developed for LBL wastes are reviewed and updated regularly.
- Approves the development and use of calibration procedures and requirements for control of measuring and test equipment.
- Develops and keeps current the LBL *Waste Management Plan*.

2.2.4 Radioactive Waste Operations Manager

- Is responsible for the supervision of LLW handling, processing, and transportation.
- Evaluates decontamination and waste disposal work, and issues assignments to Unit members.
- Organizes and trains personnel and evaluates their performance.
- Is trained in the regulations of WAC 173-303.
- Maintains up-to-date knowledge of all current Cal-EPA, DOE, and other regulations pertaining to hazardous and radioactive waste disposal for implementation within the department.
- Assures that waste is properly analyzed for a safe waste disposal system and that effective methods of minimizing and segregating wastes are instituted.
- Advises and coordinates the mixed waste and radioactive waste processing.

Continued on next page.

2. Organization and Responsibilities (continued)

-
- 2.2.4 (continued)
- Assures that waste disposal files are maintained.
  - Interacts with regulatory agencies to maintain compliance with all regulations.
  - Supervises and coordinates job assignments.
  - Assures that each assigned person reads the Waste Management QA Plan and is briefed on the HWHF quality goals, areas of responsibility, and formal work controls, with emphasis on the individual's specific responsibilities.
  - Assures that services, materials, equipment, and components of shipping containers are selected from supplier that meet DOT requirements, as specified in 49 CFR.
  - Reviews and approves the Waste Management Program procedures.
  - Finds vendors to provide services for disposal, recycling, and transportation of low-level waste, and assures that such services comply with all applicable State of California, Washington State, DOE, EPA, and DOT requirements.
- 2.2.5
Specialist
Radioactive
Waste Technicians
- Under limited supervision, collects, identifies, transports, prepares, stores, and prepares shipments (for disposal) of hazardous, radioactive, and mixed wastes.
  - Cleans up spills and decontaminates equipment/areas as required.
  - Applies comprehensive knowledge of hazards associated with hazardous and radioactive materials for safe handling, possible reuse, and appropriate disposal.
  - Improves methods to minimize LLW.
  - Maintains compliance with all applicable regulations.
-

Continued on next page.

2. Organization and Responsibilities (continued)

-
2.2.5 (continued)	• Takes prompt and appropriate action, when necessary, to prevent the effects of a detected quality problem from spreading. • Subjects LLW generated at LBL to minimization and proper packaging for shipment to approved waste disposal sites. • Evaluates contaminated laboratory equipment and reclaims it by chemical or physical decontamination. • Maintains an adequate disassembly and decontamination facility. • Maintains all required inventories and records associated with the above duties in an accurate, current, and useful format. • Performs other duties as directed by the Operations Manager.
2.2.6 Principal/Senior Radioactive Waste Technician	• Under normal supervision, performs complex duties in the field of radioisotope safety and hazardous and radioactive waste disposal and decontamination to achieve compliance with the LBL safety standards and with applicable legal requirements. • Monitors laboratory facilities, equipment, and personnel, decontaminating exposed areas. • Transports, stores, and disposes of LLW. • Keeps inspection records for all of the above. • Evaluates contaminated laboratory equipment and reclaims it by chemical or physical decontamination. • Assumes responsibility for equipment disposal based on hazardous conditions. • Performs other duties as directed by the Operations Manager.
-

Continued on next page.

2. Organization and Responsibilities (continued)

2.2.7 Compliance Unit Manager

- Is trained in the regulations of WAC 173-303.
- Maintains up-to-date knowledge of all current Cal-EPA, DOE, and other regulations pertaining to hazardous and radioactive waste disposal for implementation within the department.
- Evaluates each LBL operation that generates LLW.
- Prepares for state and Federal audits and inquiries, and responds to various regulatory entities when required.
- Interacts with regulatory agencies to maintain compliance with all regulations.
- Generates reports as required by DOE, EPA, or other regulatory agencies.
- Ensures that computer data are maintained on all waste streams.

2.2.8 Waste Certification Specialist

- Signs the certification statement on the Low-Level Waste Storage/Disposal Request.
- Certifies compliance with waste acceptance criteria in general, and with WHC-WAC and the SDAR specifically for each waste package.
- Certifies that LLW storage, packaging, waste form criteria, and waste package criteria meet the applicable requirements of WHC-WAC.
- Certifies that DOT shipping requirements for surface radiation dose rates are met.
- Certifies that labeling and marking requirements of 49 CFR 171, 172, and 173, and WHC-WAC are met.
- Certifies that the appropriate documentation and records are prepared.
- Is trained in the regulations of WAC 173-303.

Continued on next page.

2. Organization and Responsibilities (continued)

-
- 2.2.8 (continued)
- Finds vendors to provide services for disposal, recycling, and transportation of low-level waste, and assures that such services comply with all applicable State of California, Washington State, DOE, EPA, and DOT requirements.

- 2.2.9
*Compliance Unit
Data Entry Clerk*
- Maintains computer data on all waste streams.

- 2.2.10
*Waste Minimization
Specialist (Environmental Protection
Group)*
- Works with waste generators to effect waste reduction as much as practicable.
  - Investigates and implements chemical recycling programs, as practicable.
  - Maintains records of waste minimization efforts.

Note: These duties were formerly handled by Waste Management Group staff. Although these duties have been transferred to the Environmental Protection Group, they are still listed here to assure readers that the waste minimization program continues.

2.3 Principal Interfaces

- 2.3.1
Internal
- HWHF personnel interface with all generators of LLW at LBL. For radioactive materials, HWHF personnel interface with users both before the research begins and after the material has been used and is intended for disposal. Interactions also occur in the case of an emergency and when calls for information regarding the handling of LLW are received from a user.

- 2.3.2
External
- External interfaces occur with the Westinghouse Hanford Company's Solid Waste Engineering, material haulers, disposal facility personnel, and DOE, OSHA, State of California, University of California, and City of Berkeley personnel.

HWHF management also monitors the activities of "participating external groups," e.g., non-LBL organizations that provide services or materials for HWHF operations. The role of these groups is defined in various vendor purchase agreements.

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3. Certification Methodology

**3.1
Certification
Process
Description—
Requirements**

This plan for certification of LLW is designed to assure that all LLW from the LBL HWHF meets the waste acceptance criteria for the Hanford Site Central Waste Complex and Burial Grounds. These criteria are established in WHC-WAC. The certification methodology addresses the following areas:

- *Waste Reduction:* LBL imposes technical and administrative controls for the minimization of LLW.
- *Waste Segregation:* LBL has developed technical and administrative procedures to identify and segregate LLW from hazardous waste.
- *Waste Characterization:* Any waste material that is known to be, or suspected of being, contaminated with hazardous components and radionuclides is fully characterized by the waste generators.
- *Waste Package and Shipment:* All LLW packages meet the surface dose, surface contamination, nuclear criticality, thermal power requirements, void space, and gas generation criteria imposed by WHC-WAC.

These criteria and LBL compliance are discussed in detail in the following sections.

Figure 3-1 shows the master flow chart for radioactive waste at LBL, with governing LBL documents listed.

Continued on next page.

3. Certification Methodology (continued)

Figure 3-1

Master flow chart for low-level radioactive waste at LBL, with governing LBL documents listed

Continued on next page.

3. Certification Methodology (continued)

3.2

Certification

Process Description

Detailed flowcharts are provided for the following discrete activities within the certification process:

- Characterization of waste from RMMAs (Figure 3-2)
- Onsite transfer of waste to the HWHF (Figure 3-3)
- Offsite transfer of waste to the HWHF (Figure 3-4)
- Application process for SDARs (Figure 3-5)
- Documentation and release of radioactive waste to Hanford—prior to arrival of truck that will ship the waste (Figure 3-6)
- Documentation and release of radioactive waste to Hanford—after arrival of truck that will ship the waste (Figure 3-7)

3.2.1

Waste

Minimization

LBL has established a series of documents delineating the policy and procedural requirements for generation and control of LLW. These documents include

- *Guidelines for Generators* (LBL PUB-3092)
- Waste Management procedures (Appendix A)
- *Waste Management Plan, Hazardous Waste Handling Facility, LBL*
- *Waste Minimization and Pollution Prevention Awareness Plan*

These documents form the basis of technical and administrative controls imposed on the waste generators in their effort to reduce the volume and amount of LLW material requiring disposal.

LLW is assayed by the researchers, and a material balance is required. The radionuclide components are identified, and their quantities are determined and recorded at each stage of the generation process. This is done using process knowledge of the researchers or by analysis by an independent laboratory according to the requirements of the *Guidelines for Generators*. The generation and treatment of LLW at LBL is accomplished in compliance with DOE Order 5820.2A and WHC-WAC.

Continued on next page.

3. Certification Methodology (continued)

Figure 3-2

Characterization of waste from RMMAs
(adapted from EH&S Procedure 820)

Continued on next page.

3. Certification Methodology (continued)

Figure 3-3

Onsite transfer of waste to the HWHF
(adapted from EH&S Procedure 827)

*Generator may sign tag at either time.

Continued on next page.

3. Certification Methodology (continued)

Figure 3-4

Offsite Transfer of Radioactive and Mixed Waste to the HWHF
(tasks done by Radioactive Operations Unit Technician unless otherwise noted) (adapted from EH&S Procedure 828)

Continued on next page.

3. Certification Methodology (continued)

Figure 3-5

Application process for SDARs
(adapted from EH&S Procedure 830)

Continued on next page.

3. Certification Methodology (continued)

Figure 3-6 Documentation and release of radioactive waste to Hanford—prior to arrival of truck that will ship the waste
(adapted from EH&S Procedure 831)

Continued on next page.

3. Certification Methodology (continued)

Figure 3-7

Documentation and release of radioactive waste to Hanford—after arrival of truck that will ship the waste

(adapted from EH&S Procedure 831)

Continued on next page.

3. Certification Methodology (continued)

- 3.2.1 (continued) To reduce the quantities of LLW produced, individual generators are instructed to do the following:
- Minimize the gross volume of radioactive wastes by such practices as ordering only the amount of radioactive materials and chemicals used and designing experiments to use the minimum amount of radioactive materials and chemicals needed.
  - Try to modify procedures to substitute nonhazardous substances for hazardous substances.
  - Recycle or reuse chemicals.
  - Store radioactive wastes separately from hazardous wastes (oxidizers, explosives, flammables, poisons, toxics, and corrosives).
  - Separate radioactive and mixed wastes with half-lives of 45 days or shorter from other radioactive wastes.
  - Separate radioactive wastes into low-level waste, mixed hazardous and low-level wastes, transuranic wastes, and mixed hazardous and transuranic wastes. Keep each kind of waste in a separate container.
  - Do not add radioactive waste to hazardous wastes.
- 3.2.2
Radioactive
Isotope
Characterization
- Radionuclide accountability establishes the types and possibly the quantities of isotopes in the waste. The characterization of the waste identifies the radionuclides to satisfy the requirements of WHC-WAC. This includes the radionuclide distribution, concentration, and activity in the waste matrix. The characterization procedures assure that a realistic representation of the distribution of radionuclides within the waste is provided (given physical limitations). LBL radionuclide characterization procedures are detailed in the *Guidelines for Generators* and specific Waste Management procedures.
-

Continued on next page.

3. Certification Methodology (continued)

3.2.2 (continued) LBL personnel using radionuclides are responsible for characterizing the waste generated in their work areas. Their responsibilities are outlined in the *Guidelines for Generators*. Radioactive materials are analyzed before and after each chemical or physical operation. These assays are used to determine the material balance for each amount of radionuclide placed in the waste. Radioactive contaminated items are surveyed with appropriate portable instruments, and the estimated amounts of activity are determined. Both the physical and chemical composition of the waste and the radionuclides are identified by the user, aided by the HWHF Operations Technician. This information is recorded on the Radioactive Waste Tag attached to each package before the waste package is removed from the user's area. The Operations Technician examines each waste package for accuracy before removing it from the user's area.

3.2.3
Physical/Chemical
Characterization Waste certification includes the determination of the physical and chemical characteristics of the waste, including any void-filling material or absorbent. Physical/chemical characterization is accomplished similarly to the method used to characterize the radionuclide content of the waste, i.e., by use of process knowledge, indirect correlation, laboratory analysis, and inventory accountability.

At a minimum, the characterization of waste includes the following information:

- physical and chemical characteristics of the waste and any void-filling material or absorbent
- volume of the waste (total of waste and any solidification or absorbent media)
- weight of the waste (total of waste and any solidification or absorbent media)
- packaging details
- packaging date, package weight, and total volume
- transportation category [e.g., low specific activity (LSA), Limited Quantity, Type A, per 49 CFR 173].

Continued on next page.

3. Certification Methodology (continued)

3.2.4

Waste Handling and Packaging Activities

The certification process includes handling and packaging waste in accordance with procedures that assure that the waste is packaged and records generated in a manner that fulfills the requirements of WHC-WAC and the appropriate Storage/Disposal Approval Record (SDAR). This also includes the means to identify and document what is placed in waste containers and the means to prevent unauthorized or incorrect material from being placed in waste containers.

Handling Criteria

Containers meet the following handling criteria:

- All containers used for LLW with maximum gross weights <16,000 lb are compatible with forklift handling.
- Containers used for LLW storage are designed to withstand the weight of two layers of 55-gal drums stacked on top with 1,000 lb in each drum.
- Crane-unloaded containers used for LLW are equipped with lifting devices designed to safely lift the fully loaded container. All lifting attachments are designed with a 5:1 safety factor based on the ultimate strength of the materials or a 3:1 safety factor based on the yield strength of the materials, whichever is more conservative. The waste package itself is designed with a 2:1 safety factor based on yield strength of the materials. Lead must not be used in fabricating the rigging.
- Rigging details are provided to WHC by the generator at least two weeks before each shipment if special rigging or lifting is required. An additional copy is sent with the shipment. Details include a sketch showing overall dimensions, lift points, weights at each lift point, and centers of gravity of the object. If available, sketches of strong backs of lift rigs used for loading are furnished. All rigging complies with the Hanford Site hoisting and rigging requirements.

Continued on next page.

3. Certification Methodology (continued)

3.2.4 (continued)

Surface Dose Rates Surface dose rates for all packaged waste meet the requirements of 49 CFR 173.441. The maximum surface-radiation dose rate for any one package does not exceed the following:

- Contact-handled radioactive waste packages sent to disposal facilities:
  - Contact-handled 55-gal drums or smaller packages: 200 mrem/h at any point on the surface
  - Contact-handled waste packages larger than 55-gal drums: Normal surface radioactivity must not exceed 200 mrem/h. However, a marked point with surface radioactivity up to 1,000 mrem/h on the bottom and one side may be permitted with preapproval of Westinghouse Hanford Solid Waste Engineering. Such points must be marked with large orange, yellow, or red painted dots.
- Remote-handled radioactive waste packages prepared for crane or drag-off unloading must include sacrificial rigging provided by the shipper. The rigging must be packaged in such a manner that it may be attached to handling equipment without exposing field personnel to excessive radioactivity. Off-loading personnel must not work in fields in excess of 100 mrem/h. Waste generators must notify the scheduler and obtain approval from Solid Waste Operations if radiation fields in excess of 100 mrem/h are measured. A special radiation work permit and an ALARA management worksheet are required onsite when dose rates exceed 1 rem/h at 3 ft.
- Waste packages sent to the Central Waste Complex: 100 mrem/h at any point. (Packages up to 200 mrem/h may be received at the Central Waste Complex. A justification for exceeding the 100 mrem/h limit must accompany the request for storage of this waste. Approval by Solid Waste Operations is required before receipt of waste packages that exceed 100 mrem/h).
- Waste packages inside returnable overpacks: Surface dose rates do not exceed limitations discussed in this section. In addition, the inner package is suitably rigged such that personnel are not exposed to a radioactive field in excess of 100 mrem/h while removing overpacks or attaching prepared riggings to crane hooks or similar equipment.

Continued on next page.

3. Certification Methodology (continued)

3.2.4 (continued)

Other Packaging Criteria

Other packaging criteria meet the following:

- Removable surface contamination does not exceed
  - 220 dpm/100 cm² for alpha contamination
  - 2200 dpm/100 cm² for beta/gamma contamination.
- There is no fixation of surface contamination on returnable overpacks. Removable surface contamination on the interior surfaces of returnable overpacks is less than 100 times the above limit.
- Nuclear criticality limits are met if waste packages contain 15 g of ²³⁵U or less. Limits for packages containing more than 15 g are determined by WHC on a case-by-case basis.
- Thermal-power acceptance criteria included in the SDAR are met.
- Catalysts or vents required by the SDAR are properly used.
- The interior void space within containers does not exceed 10% of the container volume unless exempted by the SDAR. Interior void spaces include any opening within the waste matrix that exceeds 2 in. in diameter. Spaces smaller than 2 in. need not be included in the void calculation. Spaces larger than 2 in. must be filled with void-filling material.

Continued on next page.

3. Certification Methodology (continued)

3.2.4 (continued)

Labeling

All the LLW packages are labeled or marked with the following information:

- WRM number
- PIN bar code (Each waste package must bear a unique PIN. The bar code system used for the PIN is given in WHC-WAC.)
- Gross weight in pounds
- DOT radioactive hazard class labels as required
- "This end up," or directional arrows marked on the sides and near the top to indicate proper package orientation for packages containing inner containers of liquid. (Inner containers must be marked as to their contents.)
- The following warning on the sides of drums or on at least two sides of rectangular packages for packages containing asbestos:

CAUTION
Contains Asbestos
Avoid Opening or
Breaking Container
Breathing Asbestos is Hazardous

Alternately, the following Occupational Safety and Health Administration (OSHA) standard label can be used, as specified in WAC 296-62-07721:

DANGER
Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard
Avoid Breathing Airborne Asbestos Fibers

Continued on next page.

3. Certification Methodology (continued)

3.2.4 (continued)

Labeling (continued)

- The following information is marked on the side of each drum containing free organic liquids in inner containers:
  - **LIQUID ORGANIC WASTE**
  - The flash point or flash point range (for flammable or combustible materials with flash points below 200°F) of the material in degrees fahrenheit (e.g., flash point 160–180°F)
- Additional labeling and marking requirements are included in specific SDARs.

All labeling and marking conforms to the requirements in 49 CFR 171, 172, and 173.

Labels and marking are permanently applied with paint or other materials. Labels and markings on stored LLW have a predicted 20-year life expectancy and are compatible with the container and protective coating. Labels and markings on disposed LLW have a predicted 1-year life expectancy in the Hanford Site environment (uncovered).

All labels and markings are in clear, legible English and in a color contrasting with the background. For stored LLW, stencils (for paint-applied markings) or adhesive labels are used for all markings.

All labels and markings are nonfading and nonsmearing.

Drums banded to pallets are positioned to permit visual inspection of the labels and markings.

Continued on next page.

3. Certification Methodology (continued)

3.2.4 (continued)

Labeling (continued)

Character-size criteria for the PIN, WRM number, gross weight, and "Bottom Tier Only" markings include the following:

- Characters used in labeling and marking drums or cylindrical containers ≥ 30 gal and ≤ 55 gal are at least 1 in. high.
- Characters used in labeling and marking drums or cylindrical packages ≥ 30 gal are legible at 5 ft.
- Characters used in labeling and marking other LLW packages smaller than 12 ft³ are at least 1 in. high.
- Characters used in labeling or marking LLW packages ≥ 12 ft³, or cylindrical packages larger than 55-gal drums, are at least 2 in. high.

All other characters are legible at 5 ft.

All labeling and marking is placed on LLW packages in the following locations unless otherwise noted on the SDAR.

- Drag-off boxes: All required markings and labels are placed once each on two vertical sides.
- Other rectangular waste packages: All required markings and labels are placed once each on at least two vertical sides of the package. The PIN, gross weight, and WRM number are also placed on the top of the package.
- Cylindrical waste packages: All required markings and labels are placed once on the side of the package, aligned with the locking bolt on the drum lid. The PIN, gross weight, and WRM number are also placed on the top of the package.
- Cylindrical waste packages in horizontal orientation: All required markings and labels are placed once on the side of the package. The PIN, gross weight, and WRM number are also placed on one end of the package.

Continued on next page.

3. Certification Methodology (continued)

3.2.4 (continued)

Shipping

Procedures for shipping LLW are included in the Waste Management procedures listed in Appendix A. Quality control measures are outlined in Section 4 and the Waste Management QA Plan.

"One-trip" packagings used by the LBL HWHF are mainly 55-gallon DOT 17C or 17H drums used for the transport and burial of radioactive waste.

Two other shipping packages are used to dispose of large contaminated items:

- A 2' deep x 4' wide x 8' long plywood box, LBL Drawing 22J1223C, for shipment of induced metals and materials. The box has been approved by Westinghouse Hanford for shipment of these wastes and is described in an approved SDAR .
- A 3' x 4' x 8' long plywood box, LBL Drawing 21J9993, for shipment of noncompactable materials. The box has been approved by Westinghouse Hanford for shipment of these wastes and is described in an approved SDAR.

Other packagings may be used, as specified in approved SDARs.

3.3

Procedures and Processes Common to All Waste Streams

3.3.1 *Qualification and Training*

All users of radioactive materials are required to attend EH&S Courses 430 (Radiation Protection), 601 (Hazardous Waste Generators), and 621 (Radioactive and Mixed Waste). All attendees of Courses 601 and 621 receive copies of the *Guidelines for Generators*.

HWHF personnel receive extensive training on the handling of radioactive wastes, as well as handling of hazardous wastes. A complete list of training received by HWHF personnel is maintained by the Waste Management Training Coordinator.

Continued on next page.

3. Certification Methodology (continued)

3.3.2 *Management Assessment*

The Waste Management QA Plan provides the oversight for HWHF certification activities to assure that these activities result in the management of waste in accordance with WHC-WAC. This oversight is accomplished through the use of audits, quality surveillance, and reviews of related activities. Corrective actions and control of nonconforming items are addressed in the QA Plan and Section 4 of this document.

HWHF management reviews and assesses these procedures and processes to assure that the generators characterize the waste adequately and provide adequate environment, health, and safety protection. If deficiencies are found, HWHF management assesses the need for changes and provides the mechanisms needed to make the required changes in the procedures and processes.

3.3.3 *Activities Common to Most Waste Streams*

A number of activities are common to all waste generators regardless of waste stream. These activities are handled in a uniform manner. Model procedures are prepared by Waste Management. These model procedures are then incorporated in the facility's procedural manual and tailored to suit the situation for each waste stream. A list of these common activities follows.

- Generators and HWHF personnel handle radioactive wastes separately from all other wastes.
- Generators are scrupulous about good housekeeping in hoods, glove boxes, and laboratories.
- Generators keep the buildup of radioactive wastes to a minimum. As soon as waste containers (ice cream cartons, waste sacks in garbage cans) are filled, they are removed to the HWHF.
- Generators characterize and minimize all radioactive waste to the fullest extent possible.
- Generators provide the primary waste containers (ice cream containers, plastic bags, etc.); HWHF personnel provide approved waste collection containers (galvanized waste cans, five-gallon carboys, etc.).

Continued on next page.

3. Certification Methodology (continued)

- 3.3.3 (continued)
- All radioactive waste is collected from the generators and transported to the HWHF by HWHF or contract personnel. At the HWHF, personnel review each waste package for proper contents and accurate identification on the Radioactive Waste tag.
  - HWHF personnel prepare, package, store, and arrange for offsite disposal of the waste.
  - No liquid radioactive waste is poured down the sanitary drains. EH&S is notified immediately if liquid radioactive waste is inadvertently poured down a drain.
  - No explosives, flammables, or highly toxic chemicals are discarded with radioactive dry wastes.
  - All sharp objects (hypodermic needles, scalpels, etc.) are placed in protective containers.
  - Where required, ventilation and filtration systems are provided for all radioactive waste disposal operations to maintain radionuclides releases well below DOE guidelines.
-

3.4 LLW, Solid Compacted

3.4.1 Description

This waste stream is made up of dry solid laboratory waste contaminated with radioactive substances.

3.4.2 Characterization Methodology

The generator is responsible for characterizing the radioactive, physical, and chemical content of the waste and accurately completing the Radioactive Waste tag for each package of radioactive waste. This waste stream is characterized in accordance with the requirements of the SDAR and the guidance provided in the *Guidelines for Generators*.

3.4.3 Segregation Methodology

Researchers are trained to separate LLW from hazardous wastes. Segregation methodology is provided in the *Guidelines for Generators*.

Continued on next page.

3. Certification Methodology (continued)

3.4.4
*Waste Handling,
Packaging, and
Shipping Operations*

- The wastes are packaged at the generator areas in cement sacks inside a 24" x 38" polyethylene bag, all placed inside a 15-gallon waste can.
  - At the HWHF, the bags are compacted (4-to-1 compaction) in a 55-gallon DOT 17C or 17H drum, using a compactor.
  - The wastes are stored in the drums until they are shipped for disposal. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.
-

3.5
LLW, Solid
Noncompacted (Drums)

3.5.1
Description

This waste includes laboratory hardware over 4" x 4" x 4"—large solid items such as iron, plastic, ring stands, etc.

3.5.2
*Characterization
Methodology*

The generator is responsible for characterizing the radioactive, physical, and chemical content of the waste and accurately completing the Radioactive Waste tag for each package of radioactive waste. This waste stream is characterized in accordance with the requirements of the SDAR and the guidance provided in the *Guidelines for Generators*.

3.5.3
*Segregation
Methodology*

Researchers separate noncompactible waste, transuranic waste, mixed waste, and short-lived radioisotopes from solid waste. Segregation methodology is provided in the *Guidelines for Generators*.

3.5.4
*Waste Handling,
Packaging, and
Shipping
Operations*

The waste is contained at the generator's area in cement sacks inside a 24" x 38" polyethylene bag, all placed inside a 15-gallon waste can. The wastes are stored in the drums until they are shipped. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.

Continued on next page.

3. Certification Methodology (continued)

3.6

LLW, Solid

Noncompacted (Wooden Boxes)

3.6.1
Description This waste stream includes laboratory hardware over 4" x 4" x 4." This waste stream differs from the low-level radioactive waste stream (solid noncompacted, drums) only in that the waste is too large to fit into the 55-gallon barrels. Smaller items can be packaged with larger items.

3.6.2
Characterization Methodology The generator is responsible for characterizing the radioactive, physical, and chemical content of the waste and accurately completing the Radioactive Waste tag for each package of radioactive waste. This waste stream is characterized in accordance with the requirements of the SDAR and the guidance provided in the *Guidelines for Generators*.

3.6.3
Segregation Methodology Researchers separate noncompactible waste, transuranic waste, mixed waste, and short-lived radioisotopes from solid waste. Whenever possible, the researcher cleans items to remove hazardous substances. Segregation methodology is provided in the *Guidelines for Generators*.

3.6.4
Waste Handling, Packaging, and Shipping Operations These wastes are self-contained or wrapped in plastic if containment is required. At the HWHF, the wastes are consolidated in DOT-approved wooden boxes. The boxes meet all specifications per LBL Drawings 22J1223C and 21J9993. These boxes are approved by the Hanford Burial Site. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.

3.7

Induced Metals and Materials

3.7.1
Description Most of this waste is made radioactive by bombardment with neutrons or charged particles produced by the LBL accelerators.

3.7.2
Characterization Methodology The generator is responsible for characterizing the radioactive, physical, and chemical content of the waste and accurately completing the Radioactive Waste tag for each package of radioactive waste. This waste stream is characterized in accordance with the requirements of the SDAR and the guidance provided in the *Guidelines for Generators*.

Continued on next page.

3. Certification Methodology (continued)

3.7.3
*Segregation
Methodology*

LBL researchers and EH&S employees monitor all items and separate nonradioactive metals from this waste. Segregation methodology is provided in the *Guidelines for Generators*.

3.7.4
*Waste Handling,
Packaging, and
Shipping
Operations*

The induced metals are self-contained, and large pieces are tied to pallets by the generator. Small pieces are contained in wooden boxes. At the HWHF, personnel reduce the volume of this waste stream by cutting and fitting together the items during packaging. Materials suitable for placement on pallets are put on pallets. Small items not suitable for palletizing are packaged in wooden boxes. The wastes are stored at Building 75A until they are shipped. Waste items too large to be placed in the approved wooden box are placed on fire-retardant pallets and stored at the generator's site until they are shipped. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.

3.8
Animal Carcasses

3.8.1
Description

This waste stream is made up of laboratory animal carcasses or tissues contaminated with radioisotopes. The waste is frozen, contained in plastic bags, and stored in freezers located at the animal research laboratories, where they are kept until shipment to the disposal site.

3.8.2
*Characterization
Methodology*

The generator is responsible for characterizing the radioactive, physical, and chemical content of the waste and accurately completing the Radioactive Waste tag for each package of radioactive waste. This waste stream is characterized in accordance with the requirements of the SDAR and the guidance provided in the *Guidelines for Generators*.

All radioactive animal carcasses are packaged in slaked lime in accordance with the procedures developed by the Washington Department of Social and Health Services. This ensures that calcium hydroxide is <10% by weight of the waste. If this is the case, and calcium hydroxide is the only dangerous material present, then the carcass is not subject to regulation as a dangerous waste per the WAC 173-303-84. Animal carcasses will not be received for disposal unless they have been packaged accordingly. Animal carcasses preserved with formaldehyde are not suitable for disposal at the Hanford Site.

Continued on next page.

3. Certification Methodology (continued)

3.8.3
*Segregation
Methodology*

Researchers separate all carcasses into those containing short half-life isotopes (<40 days) and long half-life isotopes (>40 days). Hazardous materials are not injected into animals. Nonradioactive carcasses are disposed of as medical/biohazardous waste. Segregation methodology is provided in *Guidelines for Generators*.

3.8.4
*Waste Handling,
Packaging, and
Shipping
Operations*

At the HWHF, personnel package the animal carcasses in 30-gallon DOT 17C drums, which are then placed in 55-gallon drums. The procedure consists of first lining 30-gallon drums with a 4-mil (minimum) polyethylene liner. The animal carcasses are placed in the drum, with a mixture of one part lime to ten parts diatomaceous earth by weight. The amount of absorbant is sufficient to absorb twice the volume of liquid potentially present. The liner is pigtailed and sealed with 2-inch-wide plastic-reinforced cloth tape. The inner drum is sealed with a drum lid, locking ring, locking ring nut, and lock nut. A minimum of three inches of absorbant is placed in the bottom of the outer drum, a DOT 17C or 17H 55-gallon drum. The inner (30-gallon) drum is placed in the 55-gallon outer drum. The void space between the two drums is filled with absorbant. The drum closure is secured by a gasketed drum lid, locking ring, and lock ring nut. The locking ring nut is torqued, and a lock nut is applied. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.

3.9 Absorbed Tritium

3.9.1
Description

The main generator of this waste is the National Tritium Labeling Facility (NTLF) at LBL. Compounds are tagged with ^3H . Up to 200 Ci are used at one time. Unused ^3H is transferred and held in a storage tank.

3.9.2
*Characterization
Methodology*

The generator is responsible for characterizing the radioactive, physical, and chemical content of the waste and accurately completing the Radioactive Waste tag for each package of radioactive waste. This waste stream is characterized in accordance with the requirements of the SDAR and the guidance provided in the *Guidelines for Generators*.

Continued on next page.

3. Certification Methodology (continued)

- 3.9.2 (continued) Tritiated waste is waste containing >20 mCi of tritium/ m^3 of waste (4.2 mCi/55-gal drum). The disposal acceptance criteria for tritiated waste are as follows:
- Liquid tritiated waste is absorbed on an inert absorbent material within an inner leak-resistant container. The quantity of absorbent material is sufficient to absorb twice the quantity of liquid tritiated waste potentially present.
  - Inner containers with <100 Ci tritium/ m^3 (21 Ci/55-gal drum) of either absorbed liquids or solids are either sealed in one layer of 4 mil (nominal) or thicker polyethylene, or coated with 10-mil-thick (minimum) virgin asphalt, and disposed in a steel or concrete container.
  - Inner containers with ≥ 100 Ci tritium/ m^3 (21 Ci/55-gal drum) are coated completely with 1-in-thick (minimum) virgin asphalt and disposed in a steel or concrete container.
  - Sealing systems not dependent on asphalt diffusion barriers have been used to contain tritium. All welded structures, bellows-sealed valving, and flanged joints with metallic gaskets and knife-edged sealing surfaces have been used for tritium-containing materials. Such systems are acceptable for disposing tritium provided suitable technical data are furnished by the shipper to demonstrate that the tritium-containing capability of containers based on these systems is equivalent to or better than that of the asphalt barrier system.
- 3.9.3 Segregation Methodology The plastic bottles containing the waste are kept separate and not mixed with any other wastes by the generators. Segregation methodology is provided in the *Guidelines for Generators*.
- 3.9.4 Waste Handling, Packaging, and Shipping Operations Absorbed tritium waste will be packaged, labeled, and shipped per the approved SDAR. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.
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Continued on next page.

3. Certification Methodology (continued)

3.10

Liquid Low-Level Waste

3.10.1

Description

This waste consists of research laboratory solutions with radioisotopes and nonhazardous substances.

3.10.2

Characterization Methodology

The generator is responsible for characterizing the radioactive content of the waste and accurately filling out the Radioactive Waste Tag for each package of radioactive waste. Before the wastes are solidified, they are analyzed for total activity. This waste stream is characterized, segregated, and packaged in accordance with the applicable SDAR. Before and after the wastes are solidified, they are analyzed for organics and heavy metals. Guidance on characterization is provided in the *Guidelines for Generators*.

Disposal Criteria

Packages of LLW containing wastes in liquid form are disposed of in the Hanford Site 200 Area facilities. All liquids disposed of as LLW are solidified, absorbed, or otherwise bound in the waste matrix by inert materials. The resultant waste matrix is not capable of spontaneous combustion, decomposition, explosion, liquid desorption, or affecting the integrity of the containment barriers in any way.

If the resultant waste matrix is capable of gas generation, the container is vented and contains catalyst packs to deplete oxygen and prevent explosive concentrations of hydrogen or other explosive gases (e.g., methane, volatile organic compounds) and oxygen. The use of vents or catalyst packs is specified in the applicable SDAR. If used, the catalyst packs will be palladium on alumina or platinum on silica, depending on the potential amount of moisture present in the waste package. The amount of catalyst required will be based on the amount of potential hydrogen generation and will be specified in the applicable SDAR.

If liquids are bound by absorption, the absorbent material is placed in direct contact with the liquid. The quantity of absorbent material is sufficient to absorb twice the volume of liquid potentially present or as specified in the SDAR. Combustible absorbent (Conwed™ pads or equivalent) is used with organic liquids. Noncombustible absorbent is not accepted with organic liquids since this material interferes with future processing of that liquid. A list of acceptable absorbents and void fillers is contained in WHC-WAC.

Continued on next page.

3. Certification Methodology (continued)

3.10.2 (continued)

Storage Criteria

Some LLW in liquid form (such as some scintillation liquids and nonhazardous liquid organics with properties incompatible with land disposal) is accepted for storage at the Hanford Site 200 Areas facilities to eventually be destroyed when a waste processing facility becomes available. Liquids accepted for storage may be absorbed as described above, packaged as described below, or packaged as described in the applicable SDAR. Liquids to be stored are not solidified in concrete or grout unless approved by WHC.

The liquid is sealed in leak-resistant containers of not more than 5-gal rated capacity for plastic or metal and 1-gal rated capacity for glass. The total quantity of liquids per each 55-gal drum does not exceed 15 gal. The inner container is packaged with a combustible absorbent such as Conwed™ pads or approved equivalent for absorption of oils. Sufficient absorbent is included in the package to absorb at least twice the maximum amount of liquids potentially present.

If the resultant waste matrix is capable of gas generation or pressure buildup, the container is vented and contains catalyst packs to deplete oxygen and prevent explosive concentrations of hydrogen or other explosive gases (e.g., methane, volatile organic compounds) and oxygen. The use of vents or catalyst packs is specified in the applicable SDAR. If used, the catalyst packs will be palladium on alumina or platinum on silica, in the amount specified in the applicable SDAR.

If liquids are bound by absorption, the absorbent material is placed in direct contact with the liquid. The quantity of absorbent material is sufficient to absorb twice the volume of liquid potentially present or as specified in the applicable SDAR. The absorbent is selected based on the final treatment or disposal technology employed. The applicable SDAR specifies the absorbent to be used. Liquids are not absorbed, solidified, or otherwise packaged without the concurrence of WHC.

3.10.3 *Segregation Methodology*

Researchers separate all hazardous solutions (mixed waste) from nonhazardous solutions. They identify all reagents in the liquid waste. Segregation methodology is provided in the *Guidelines for Generators*.

Continued on next page.

3. Certification Methodology (continued)

3.10.4

Waste Handling, Packaging, and Shipping Operations

The waste is contained in the generator's area in glass or plastic bottles. At the HWHF, the wastes are analyzed for radioactivity. If the radioactivity is unusually high, the Field Technician contacts either the waste hauler or the researcher for additional information. The liquid is checked for pH. If the pH is 1–3, the acid is neutralized. After these procedures are done (if necessary), the liquid is poured into a 55-gallon DOT 17C or 17H drum and mixed with WHC-WAC-approved absorbant (different absorbants, depending on the composition of the liquid) until it is solidified. The drums are stored in Building 75A until they are shipped to the disposal site. Specific handling, packaging, and shipping procedures are provided under the Waste Management procedures listed in Appendix A.

3.11

Methodology for Infrequent or Unforeseen Waste Certification

The methodology for infrequent or unforeseen waste certification will follow the methodology established for the most similar existing waste stream, with those modifications necessary for health, safety, environmental protection, and adequate characterization and packaging of the waste. Basic methodologies follow.

- Generators will be responsible for characterizing all aspects of the waste (radioactive, hazardous, nonhazardous), as established in existing procedures for the various waste streams. Generators will also be responsible for segregating and separating the waste, as established in existing procedures for the various waste streams.
  - Sampling will be done at the HWHF as necessary to characterize the waste.
  - A task team will be set up to determine the best way to apply for the proper SDAR.
  - All other procedures will follow existing practice as closely as possible, allowing for the differences in the new waste streams.
-

Continued on next page.

3. Certification Methodology (continued)

3.12 Minimization

The *Waste Minimization and Pollution Prevention Awareness Plan* provides the policy, strategy, objectives, and goals for waste minimization at LBL. Waste minimization techniques are applied through

- inventory management
- operational procedures
- a maintenance program
- material changes and process equipment modification
- recycling and reuse.

A training program provides LBL employees with instruction on the implementation of the waste minimization plans. Tracking and reporting systems and the Waste Management QA Plan provide a means to verify the implementation of the waste minimization plan activities.

Policies currently in place at LBL to achieve waste minimization include

- holding short-lived isotopes at HWHF for decay
- keeping contaminated and noncontaminated items separate
- using good housekeeping in hoods, glove boxes, and laboratories
- reusing or decontaminating solid noncompacted waste (drums, wooden boxes)
- instructing researchers to avoid introducing items needlessly into radiation fields
- instructing researchers to use the minimum amount of material necessary
- instructing researchers to use nonhazardous materials instead of hazardous material whenever possible
- disposing of explosive, flammable, or highly toxic chemical wastes separately from radioactive waste (no mixing)
- requiring all employees to take EH&S courses 430 (Radiation Protection), 601 (Hazardous Waste Generators), and 621 (Radioactive and Mixed Waste), which include training in waste minimization and disposal procedures
- keeping buildup of all wastes to a minimum.

Continued on next page.

3. Certification Methodology (continued)

3.13 Segregation

Specific segregation instructions are contained in the *Guidelines for Generators*. LLW is segregated to reduce any hazardous-waste components using standardized processes and methods. LLW is segregated into separate waste containers to avoid mixing with other waste streams.

The HWHF establishes the policy and procedures for the minimization and segregation of LLW in the *Waste Minimization and Pollution Prevention Awareness Plan* and the Waste Management procedures listed in Appendix A.

3.14 Onsite Treatment and Storage

The California Department of Toxic Substances Control (DTSC) has approved LBL's Part B Permit Application for all LBL treatment processes. Various treatment processes are included. The generator is required to chemically, radiologically, and physically characterize the LLW, prior to any waste pick-up and transport to the HWHF by the technician. The waste is stored at the HWHF in DOE approved 55-gallon drums (17H or 17C).

3.15 Waste Characterization, Sampling, and Analysis

3.15.1 Characterization

All LLW is properly characterized chemically, radiologically, and physically. Prior to the approval of the transfer of any waste to the HWHF, the generator is required to estimate the radioactive and chemical concentrations or amounts of contaminating radionuclides using process knowledge or laboratory analysis as defined in *Guidelines for Generators*. Upon completion, the generator certifies that the waste has been accurately and completely characterized. The HWHF Field Technician then reviews the information for accuracy in accordance with applicable regulations and monitors, tags, and packages the wastes for onsite transport to the HWHF.

Continued on next page.

3. Certification Methodology (continued)

3.15.1 (continued) The generator, with assistance from the HWHF Field Technician, reviews each waste stream against the lists of wastes identified in California Regulations, including:

- The "Hazardous Waste from Non-Specific Sources" list (F-List), 40 CFR 261.31
- The "Hazardous Waste from Specific Sources" list (K-List), 40 CFR 261.32
- The "Discarded Commercial Chemical Products, Off-Specification Species, Container Residues, and Spill Residues Thereof" list (P-List and U-List), 40 CFR 261.33

Each waste stream must also be characterized, either by generator certification or by hazard categorization, to identify its hazardous waste characteristics:

- ignitability, as defined in 40 CFR 261.21
- corrosivity, as defined in 40 CFR 261.22
- reactivity, as defined in 40 CFR 261.23
- toxicity, as defined in 40 CFR 261.24

All LLW is characterized to demonstrate that it is LLW as defined in accordance with DOE Order 5820.2A. Radionuclide constituents are individually identified by isotope, and their concentrations are determined.

In addition, all LLW is physically characterized to demonstrate that it meets the specifications required by WHC-WAC. Any deficiency is clearly indicated so that the waste can be properly treated prior to final packaging for shipment to the disposal site.

Continued on next page.

3. Certification Methodology (continued)

3.15.1 (continued) Characterization data include all radionuclides that contribute >1% (by Curies) of the total activity of the waste matrix, and any of the following radionuclides, even if they contribute <1% of the total activity (if in greater than class A quantities; see 10 CFR 61.55 [18]): ^3H , ^{14}C , ^{60}Co , ^{59}Ni , ^{63}Ni , ^{79}Se , ^{90}Sr , ^{94}Nb , ^{99}Tc , ^{129}I , ^{241}Pu , ^{242}Cm , ^{137}Cs , and alpha-emitting nuclides with half-lives >5 yr. Reporting of the radionuclides includes any parent-daughter radionuclide pairs that meet the above criteria (e.g., ^{137}Ba must be reported with ^{137}Cs , ^{90}Y must be reported with ^{90}Sr).

Naturally occurring radioisotopes are reported on the LLWSDR form if they meet the above requirements and are the reason for the waste being declared radioactive, or if they have been enriched in any way. If these isotopes are incidental to fission or activation products that cause the waste to be declared radioactive, then the naturally occurring radioisotopes need not be entered on the LLWSDR form.

3.15.2
*Waste Sampling
and Analysis*

LLW sampling and analysis is performed in accordance with recognized industry methods and standards. The sampling procedures used by the HWHF to characterize radioactive waste are presented in the *Waste Analysis Plan* [19]. Sampling and analysis provide for an accurate representation of the waste in accordance with statistically valid or EPA-approved methods. It is the policy of the HWHF that ten percent of the liquid-waste packages accepted for disposal are verified by a certified laboratory for the accuracy of information provided on the Radioactive Waste tags. Ten percent of solids are sampled to verify that their contents match the descriptions listed on the Radioactive Waste tags. Generators must refer to the *Guidelines for Generators* for specific parameters of analysis, sampling techniques, and types of containers required for adequate waste sampling and analysis.

For circumstances where sampling and analysis are not feasible or necessary for characterization of radioactive constituents, techniques that rely primarily on knowledge of the process can be used. This process knowledge is reviewed and approved by the Waste Certification Specialist. Documentation of this process knowledge is a requirement.

Continued on next page.

3. Certification Methodology (continued)

3.16 Waste Form Criteria

LLW containing significant concentrations of ^{14}C , ^{79}Se , ^{99}Tc , or ^{129}I has been determined to pose a long-term health hazard. These wastes are evaluated for storage or disposal acceptability on a case-by-case basis. Significant concentrations of these radionuclides are concentrations that exceed the Class I levels indicated in WHC-WAC.

LLW forms capable of generating toxic gases, vapors, fumes, or liquids are not accepted (as indicated in DOE Order 5820.2A, Chapter III, section 3.i.[5][d]). Specific waste forms that could be stored or disposed at the Hanford Site 200 Areas facilities also meet the waste form criteria described in the following.

3.16.1 *Asbestos*

All LLW containing asbestos must be packaged in accordance with the requirements of 40 CFR 61.150. If 40 CFR 61.150 section (a) (1) (iii) is used, then the following applies: The material must be wetted, placed in a 4-mil or heavier plastic bag, and sealed wet using 2-in-wide, fabric-reinforced tape or approved equivalent. The water used in this case is considered to be part of the packaging and not a free liquid. The material must then be packaged in a leak-resistant container that meets applicable shipping requirements for the radioactive content of the package involved. Sharp edges and corners within the package must be padded or otherwise protected to prevent damage to the plastic inner wrap during handling and shipping.

The outer package must be marked with the proper asbestos warning label as outlined in WHC-WAC and 40 CFR 61.150 (a) (1) (iv).

3.16.2 *Ion-Exchange Resins*

All ion-exchange resins disposed as LLW must be thoroughly drained and stable, and must not react with normal surroundings to create excessive heat or corrosive-reactive products. The container must be vented, or a catalyst pack may be required if the ion exchange resin is capable of gas generation.

All resins received at the Site 200 Areas facilities for disposal must be evaluated for hazardous-waste content. Sufficient data must be provided by the generator so that a regulatory designation can be performed in accordance with WAC 173-303. Data provided must include a processing history, which should describe any materials absorbed on the resin in processing; chemical compositions of column washes; operating temperatures; and dates of column loading, unloading, and operation. Nitrated organic resins are not normally suitable for disposal. If the resins contain hazardous material, the waste must comply with WHC-WAC.

Continued on next page.

3. Certification Methodology (continued)

3.16.3 *Alkali Metals*

Acceptance criteria for LLW contaminated with alkali metals are as follows:

- Waste items accepted for burial must not have unreacted alkali metal contamination that would require regulation of the material as mixed waste.
- Components having surface-adherent alkali metal contamination resulting from operational history must be processed to react and remove residual material from internal and external surfaces via either alcohol or moist gas processing before packaging for disposal. Very small amounts of adherent alkali metals can be removed by water immersion or wiping with moist rags if the operation can be done safely.
- Containers may require vents or other approved devices as specified in the applicable SDAR if alkali-metal-contaminated waste is capable of gas generation.
- Ancillary materials resulting from working with, or cleanup of, radioactive alkali metals must be individually visually inspected for the presence of unreacted alkali metals or residuals before packaging for disposal. Any evident alkali metal contamination must be removed. The remaining material must be verified free from any reactive residuals by standard alkali metal cleaning techniques: moist rag or steam or water bath, as appropriate.
- For materials unable to meet the above criteria, Westinghouse Hanford Solid Waste Engineering must determine, based on quantity of alkali metals present, whether the waste should be classified as mixed waste and handled according to the requirements in WHC-WAC.

Continued on next page.

3. Certification Methodology (continued)

3.16.4
*Explosives and
Compressed Gases*

The following criteria apply to explosives and compressed-gas cylinders in LLW packages:

- The waste must not be capable of detonation, explosive decomposition, reaction at normal pressures and temperatures, or explosive reaction with water.
- The waste package must not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste.
- Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C. Gas cylinders must be permanently vented. Aerosol cans are allowed if the container has been punctured or otherwise vented or if the propellant has been exhausted.

3.16.5
*Pyrophoric
Materials*

Pyrophoric materials in LLW packages must be rendered safe through mixture with chemically stable materials such as glass or concrete, or through processing to remove the hazardous properties.

3.16.6
Classified Waste

Some forms of low-level radioactive waste are classified for security reasons. Waste generators must include the fact that the waste they intend to ship to the Hanford Site is classified as part of their initial request for approval to store or dispose of the waste. Westinghouse Hanford will also need sufficient information about the nature of the classification, the type of packaging, and the way in which the waste will be shipped (i.e., SST or other method) to provide adequate security. Special packaging, shipping, and handling requirements will be managed on a case-by-case basis and will be provided in the SDAR.

Continued on next page.

3. Certification Methodology (continued)

3.17

Waste Package Criteria

3.17.1

Packaging

All LLW packages accepted for disposal by WHC meet the criteria listed in the following sections.

3.17.2

Surface Dose Rates

Waste packages have a maximum surface dose rate at contact not greater than 100 mrem/h (beta, gamma, and neutron) at any point. Packages up to 200 mrem/h may be received at WHC; however, justification for exceeding 100 mrem/h is needed, and approval by Hanford Solid Waste Operations is required before receipt of the waste package.

HWHF personnel measure surface dose rates according to the applicable procedure. Maximum contact surface dose rates are entered on the LLWSDR. Recorded surface dose rates are dose rates at the highest measured points on the surface of the drum or the box.

3.17.3

Surface Contamination

LLW waste packages have no removable surface contamination exceeding 220 dpm/100 cm² for alpha contamination and 2,200 dpm/100 cm² for beta-gamma contamination.

HWHF personnel monitor waste drums and waste boxes for removable surface contamination using swipe techniques according to EH&S Procedure 868.

3.17.4

Nuclear Criticality

Nuclear-criticality safety is provided for LLW by limiting the fissile content of the waste packages. Limits for waste packages that contain more than 15 g of ²³⁵U are determined by WHC Solid Waste Engineering on a case-by-case basis. These limits are indicated in the SDAR. Waste packages containing 15 g of ²³⁵U or less do not require a separate criticality safety analysis.

3.17.5

Thermal Power

The acceptance criteria for waste package exceeding 0.1 watt/ft³ are included in the applicable SDAR. Each waste package meets the requirements of 49 CFR 173.442 for heat generation and temperature.

The Waste Certification Specialist or designee performs calculations for thermal power output in accordance with procedures specified in Appendix D of WHC-WAC.

Continued on next page.

3. Certification Methodology (continued)

3.17.6
Gas Generation

When the use of catalysts or vents is required for LLW packages, it is specified in the applicable SDAR. Liners other than plastic bags are provided, with positive gas communication to the outer container.

3.17.7
Interior Void Spaces

Bulky or heavy waste items are blocked inside the container to prevent shifting during handling and transport. Void spaces within the container do not exceed 10% of the container volume.

3.18
Containers

Containers must be in good condition, with no visible cracks, holes, dents, bulges, corrosion, or other damage that could compromise integrity. Any containers that are bulged, corroded, or otherwise damaged are not used. The waste container is repaired, or the waste is repackaged or overpacked in a container meeting the criteria of WHC-WAC.

Containers are not used for shipment or storage of wastes that could react with or degrade the container by physical, chemical, or radiological mechanisms, unless internal container protection has been provided and documented in the LLWSDR.

Waste containers specifically marked for radioactive application are not used for nonradioactive purposes. Solid waste generated in RMMAs, if determined to be contaminated, is accumulated, if practical, in containers meeting the criteria in this manual. Otherwise, the accumulation container is overpacked in a container that does meet these requirements, or the waste is transferred to one that does.

Cardboard or fiberboard boxes are not used for the containment of LLW. LLW to be compacted is packaged in plastic bags and transported in a reusable container. Specific criteria for compactible LLW are contained in the applicable SDAR.

Fifty-five-gallon drums are banded in groups of four and palletized to facilitate offloading by forklift when possible. Drums are usually loaded onto trucks one at a time.

Continued on next page.

3. Certification Methodology (continued)

3.18.1

Types and Specifications

All LLW shipments are packaged in DOT-specification containers appropriate to the classification of the waste stream and as specified in the applicable SDAR. All LLW accepted for storage at Hanford Site 200 Area facilities is packaged in DOT-specification 17H or 17C steel 55-gallon drums. Other containers may be approved in the applicable SDAR. Exterior surfaces of 55-gallon drums must be either painted or galvanized in accordance with specification HS-V-P-0010-A. Protective coatings for waste packages larger than 55-gallon drums are specified in the SDARs for individual waste streams.

3.18.2

Procurement

The container type is approved by the HWHF Waste Certification Specialist prior to actual procurement. The approval is based on actual testing performed at LBL or by certification in writing from the vendor that the containers meet the design requirements. The vendor is required to submit all documentation related to the method used to demonstrate compliance. This procurement process is presented in detail in EH&S Procedure 822, *Container Procurement, Receipt, and Control*.

3.18.3

Receipt and Inspection

Prior to use of any containers, they are inspected inside and out by a trained HWHF Technician. Inspection is conducted on receipt to ensure that the containers have not been damaged in a way that will affect their integrity.

The drum is inspected for

- dents
- deformation of sealing surfaces
- continuity of welds
- surface coating, and lack of imperfections
- rust and nicks.

The results of this inspection, as well as the name of the person conducting the inspection, are submitted to the Waste Certification Specialist, who is knowledgeable in the criteria for determining the extent of any damage to a container and corresponding reduction of its integrity. This receipt and inspection process is presented in EH&S Procedure 822, *Container Procurement, Receipt, and Control*. Documentation tests conducted on drums to qualify them as DOT Specification Type A container are filed with the HWHF.

Continued on next page.

3. Certification Methodology (continued)

3.18.4 Control

Containers used for onsite transfer of LLW to the HWHF from the generator facilities are approved for onsite use and in good condition, with no signs of damage that could affect the containment capability.

Containers used for packaging and transportation of LLW from LBL to the disposal site are controlled to ensure that the integrity to the container has not been affected during packaging or handling. EH&S Procedure 822 is used to ensure that the internal, as well as the external, surfaces have not been unacceptably damaged. These containers are also managed to avoid adverse influence from weather or other factors on the containment capability of the waste package while it awaits packaging, is packaged, or awaits transfer after closure.

3.18.5 Containment

All LLW packages include at least two containment barriers, or as specified in the applicable SDAR, to prevent the release of contamination. External containment barriers are jeopardized by wind, blowing sand, precipitation, sunlight, extreme temperatures, or stresses due to the weight or configuration of the container or its contents plus the loads associated with handling and transportation.

Examples of two containment barriers include a plastic bag or a plastic liner inside a steel drum, or a steel drum inside another steel drum. Construction material of the container is compatible with the contained waste.

The following containers are exempted (as specified in the applicable SDAR) from the double-containment requirement by WHC but provide at least one containment barrier:

- Containers that have been demonstrated by engineering analysis or testing to meet the appropriate DOT Drop Test and Penetration Test requirements in 49 CFR 173, Subpart I
- Self-contained and other waste packages containing DOT LSA or limited quantities of radioactive materials that only require strong, tight containers

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Continued on next page.

3. Certification Methodology (continued)

- 3.18.5 (continued)
- Heavy-walled, high-pressure equipment that meets the following requirements:
    - A life expectancy in excess of 300 yr, when buried at the Hanford Site
    - External wall thickness of 1 in. or more carbon or stainless steel with openings welded closed using 1-in.-thick or heavier covers, or an approved equivalent
    - No TRU or hazardous materials contained internally or on external surfaces

3.18.6
Fire Retardancy

All containers used for disposal of LLW, with the exception of plastic wrap contained therein, are constructed of metal or are fire-retardant. Containers for storage of LLW are constructed of metal. As a minimum, all exterior surfaces of wooden containers are treated for fire retardation with a fire-retardant coating having a maximum flame-spread index of 25 when tested to American Society for Testing Materials (ASTM) Standard E-84-84a [20].

3.19 Shipping

3.19.1
Labeling and Marking

All LLW packages shipped to the Hanford Site 200 Area for storage or disposal meet the labeling and marking criteria specified in 49 CFR 171, 172 and those of WHC-WAC.

3.19.2
Packaging

Packaging for the different LLW streams is described in the EH&S procedures listed in Appendix A.

3.19.3
Handling

All waste packages from LBL are provided with permanently attached skids, cleats, offsets, rings, handles, or other auxiliary lifting devices to allow handling by means of a forklift, crane, or similar handling equipment. Additional handling requirements specified in WHC-WAC are also followed.

Continued on next page.

3. Certification Methodology (continued)

3.19.4

Documents

The driver is given copies of the following documents:

- University of California Shipping Document
- LBL Hazardous Materials Shipping Paper
- Hanford Operation Low-Level Waste Storage/Disposal Record
- Bill of Lading
- Exclusive Use Shipment Statement, as applicable.

The driver signs the Bill of Lading and the University of California Shipping Document. Documentation is detailed in EH&S Procedure 831, *Radioactive Waste Documentation/Release Procedures for Shipments to Hanford Burial Site and Central Waste Complex*.

3.19.5

Transportation

EH&S Procedure 827, *Onsite Transportation of Radioactive and Radioactive Mixed Waste from the Site of Generation to the HWHF*, describes onsite transport procedures for low-level waste. EH&S Procedure 828, *Offsite Transfer of Radioactive Waste to the HWHF*, describes procedures for transporting low-level waste over public roads to the HWHF. EH&S Procedure 831 describes procedures for preparing low-level waste for transport to the Hanford site.

Onsite Transfers

Type A quantities of radioactive waste are transported in cans that are placed in 17H drums or lockable boxes permanently bolted to the trucks. Liquid waste has absorbent material in the can surrounding the container of the liquid.

Offsite Transfers

Offsite transfers of LLW from non-hill LBL sites to the main LBL site are done in DOT-specification containers. LLW is shipped to Hanford in accordance with WHC-WAC requirements. All wastes will have shipping papers, markings, and labeling per DOT regulations and the appropriate SDAR.

3.20

Certification, Data Collection, and Record Keeping

3.20.1

Certification Procedure

Certified waste is waste that has been confirmed to comply with disposal/storage site waste acceptance criteria under an approved certification program.

Certification is the process of assuring that each waste package complies with all applicable criteria for offsite shipment, storage, and disposal. For LBL, this includes meeting WHC-WAC.

Continued on next page.

3. Certification Methodology (continued)

3.20.1 (continued) It is the responsibility of the LBL Waste Certification Specialist to sign the certification statement on the LLWSDR.

Compliance with waste acceptance criteria includes proper performance of the following:

- identifying the waste through characterization or through sampling and analysis
- packaging
- labeling and marking
- documenting the waste.

For each waste package, the Waste Certification Specialist certifies adherence to

- all governing regulations
- all applicable storage/disposal-site waste acceptance criteria
- all requirements specified in the SDAR for a particular type of waste.

The Waste Certification Specialist certifies that the requirements of WHC-WAC are met.

In addition to shipping papers, the following documentation is prepared accurately and completely and certified by the Waste Certification Specialist for each LLW package accepted for storage or disposal at the Hanford Site 200 Areas facilities:

- DOE/NRC 741 form, if the waste contains accountable nuclear material (The comments of more than one waste package may be included on this form.)
  - LLWSDR
  - Rigging details for special handling, as required
-

4. Quality Assurance

4.1 QA Organization, Duties, and Responsibilities Summary

The LBL Waste Management Quality Assurance (QA) Plan describes the Quality Assurance organization, duties, and responsibilities for the management of activities required to handle, store, and prepare for shipment LLW at LBL. The program has been designed to ensure that generated waste meets the following:

- WHC-WAC
- NQA-1-1989, *Quality Assurance Program Requirements for Nuclear Facilities* [21]
- DOE Order 5700.6C, *Quality Assurance* [22]
- DOE Order 5820.2A, *Radioactive Waste Management*
- Code of Federal Regulations (CFR) 40
- LBL PUB-3111, the *LBL Operating and Assurance Program Plan* [23]

The Waste Management QA Plan is the written quality assurance program plan required by the LBL Operating and Assurance Program Plan (OAPP) for EH&S activities related to the HWHF.

4.2 Summary of the Facility Quality Assurance Program

The LBL Waste Management QA Plan establishes the framework and requirements that are met in planning, implementing, documenting, and verifying HWHF activities. The subsections that follow identify the implementing plans and procedures.

4.2.1 *Organization and Responsibilities*

The organizational structure, functional responsibilities, level of authority, lines of communication, and the interface relationship required for activities affecting the quality of the waste handling program are delineated in the QA Plan. Figures 4-1 and 2-1 show the organizational relationships of positions. Functional responsibilities are listed in the following pages by job title.

Continued on next page.

4. Quality Assurance (continued)

Figure 4-1

EH&S Organization

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Continued on next page.

4. Quality Assurance (continued)

EH&S Division Director

The Division Director, Environment, Health and Safety Division, is responsible for the functions listed below. The Director may delegate any or all of the EH&S QA program functions to the Deputy Division Director or other appropriate personnel but retains overall management responsibility for such functions.

- Ensures that the LBL OAP requirements are appropriately implemented through the use of notebooks and/or plans and procedures, using the graded approach outlined in the OAP.
- Administers the division self-assessment process, which supports the assessment requirements of the OAP.
- Provides sufficient divisional resources to support the objectives and implementation of OAP requirements.
- Determines which EH&S documents, instructions, and drawings are controlled, and maintains a master list of these documents.
- Ensures that sufficient records are generated, identified, and maintained to accurately demonstrate completed Division, department, and group work and activities.
- Develops and issues the Division Self-Assessment Program Implementation Plan.
- Administers the Division self-appraisal process, and provides adequate resources for implementation, including the Laboratory Self-Assessment Database (LSAD).
- Participates in the Division self-assessment process to ensure that the Division focus is on achievement of performance objectives and quality improvement.

Continued on next page.

4. Quality Assurance (continued)

EH&S QA Manager

The Environment, Health and Safety Division QA Manager is responsible for the functions listed below. The EH&S QA Manager may delegate any or all of these functions to other appropriate personnel but retains overall management responsibility for such functions.

- Provides guidance and consultation to Division personnel and management regarding quality assurance/conduct of operations (QA/CO) requirements and methods.
- Acts as a primary point of contact with OAA's QA/CO Group for Division QA/CO matters, such as independent assessment coordination, promulgation of new requirements or information, and training.
- Reviews and approves WM Group quality assurance plans, quality implementation plans, and operational plans and procedures to assure inclusion of QA requirements.
- Monitors WM quality-affecting activities by conducting reviews, quality surveillances, audits, and other assessments.
- Assists WM personnel in QA matters through guidance, consultation, and participation in training activities, document reviews, meetings, presentations, and task forces.
- Monitors computer software code development and verification activities.
- Monitors design activities by participating in design reviews, conducting surveillances and audits, and reviewing appropriate output documents.
- Monitors the procurement process to verify that applicable procurement documents and procurement actions include appropriate QA requirements.

Continued on next page.

4. Quality Assurance (continued)

EH&S QA
Manager
(continued)

- Directs contractor and vendor QA surveillances and audit processes, approves contractor and vendor qualifications, and reviews contractual documents for inclusion of appropriate QA provisions.
  - Verifies that personnel performing special processes, inspections, tests, and other quality-affecting activities are properly trained, qualified, and certified, as applicable to the activity.
  - Prepares implementing procedures that provide specific requirements and methods for training, qualifying, and certifying assessment personnel. Personnel are trained and qualified per the requirements described in Section 5.3.2 of the OAP.
  - Verifies that inspections are performed at appropriate activity intervals and that tests are properly planned.
  - Verifies that measuring and test equipment items used in WM quality-affecting activities are controlled, calibrated, and documented by the applicable EH&S organization.
  - Reviews and concurs with dispositions of nonconformance and corrective action reports (NCARs), where the WM QA Plan or related procedures are affected by the resolution of the NCAR.
  - Initiates corrective-action documentation for conditions adverse to quality, and investigates and validates corrective-action reports.
  - Verifies corrective-action implementation.
-

Continued on next page.

4. Quality Assurance (continued)

Environment Department Head

The Environment Department Head is responsible for the functions listed below. The Environment Department Head may delegate any or all of the QA program functions to staff members but retains overall management responsibility for such functions.

- Manages Environment Department operations, personnel, and activities, including the implementation and application of this WM QA Plan.
- Fulfills the objective of assuring that operations are carried out in a safe manner, meeting applicable requirements of LBL, and complying with appropriate DOE, DOT, EPA, Cal/EPA, and QA regulations in handling, storage, and transportation of hazardous and/or radioactive wastes.
- Defines corrective-action and improvement details with the objective of assuring that they are completed, effective, properly documented, and closed.
- Approves and issues the WM QA Plan and any revisions.
- Performs periodic management reviews of the WM QA Plan and system, in order to direct corrections and improvements.
- Implements the EH&S QA program as it relates to the activities of WM.
- Determines the need for and assures that appropriate QA plans, procedures, and instructions are developed for applicable department activities.

Continued on next page.

4. Quality Assurance (continued)

Environment
Department
Head (continued)

- Approves software design plans and code validation and verifies requirements applicable to WM.
- Plans design activities, and reviews design inputs, outputs, and reports.
- Participates in design verification as appropriate, and implements configuration management and design procedures.
- Assures that procurement documents include the appropriate technical, regulatory, LBL Procurement Department, and QA requirements applicable to that item or service, including receipt, inspection, and acceptance.
- Develops and implements appropriate controls for assuring that only properly identified and controlled items are used in quality-affecting activities.
- Develops test plans, overviews testing activities, and assures that test results are properly documented.
- Assures that measuring and test equipment used in the acceptance of data is properly calibrated.
- Assures that conditions adverse to quality are identified and documented.
- Assures that personnel generate and maintain QA records, and directs departmental document and records management functions.
- Provides input into quality verification schedules, and assures the availability of personnel participating in these activities.
- Reports information directly to the EH&S Division Director on issues affecting quality in WM where independence from WM is deemed necessary.

Continued on next page.

4. Quality Assurance (continued)

Waste Management Group Leader

The Waste Management Group Leader is responsible for the functions listed below. The Waste Management Group Leader may delegate any or all of the QA program functions to staff members but retains overall management responsibility for such functions.

- Applies and documents OAP requirements using the LBL graded approach outlined in the OAP.
- Periodically assesses WM performance against established performance objectives and OAP requirements, and takes corrective action as necessary.
- Develops, issues, maintains, and controls the WM Function Notebook and the Hazardous Waste Handling Facility (HWHF) Facility Notebook.
- Ensures that personnel are qualified, trained, and proficient for assigned tasks.
- Determines and documents job requirements and qualifications, and evaluates initial qualifications of personnel for a position.
- Determines and documents the initial and ongoing training requirements for employees, including specialized job training, mentoring, on-the-job training, ES&H training, and OAP orientation training.
- Periodically evaluates and documents staff proficiency.
- Provides administrative controls for on-the-job training.
- Specifies those activities that require written procedures, instructions, or drawings.
- Develops and approves administrative, QA-related, CO-related, maintenance management-related, and operating procedures as required for the appropriate activities.

Continued on next page.

4. Quality Assurance (continued)

Waste
Management
Group Leader
(continued)

- Plans, reviews, and documents design activities.
- Ensures that measuring and test equipment items are calibrated and maintained in accordance with their actual or intended use.
- Ensures the use of properly identified and controlled items to prevent the use of incorrect or defective items.
- Plans and performs inspections or tests of completed work at appropriate intervals.
- Uses the LBL procurement system to ensure that items meet requirements and perform as specified.
- Ensures the control and use of those documents associated with WM that provide instructions or direct the work.
- Ensures that records are generated, identified, and maintained to demonstrate completed WM work.
- Regularly and routinely observes and surveys activities, and takes an active role in prevention of quality problems, correction of deficiencies, and improvement of performance (ongoing assessment).
- Performs, documents, and reports on management assessment (self-assessment).
- Cooperates with the independent assessment (functional appraisal) process and assessors.
- Tracks identified problems and corrective actions using LSAD.
- Assures that nonconforming conditions are promptly addressed and documented.
- Performs root-cause analysis of significant or recurring problems.

Continued on next page.

4. Quality Assurance (continued)

Waste
Management
Operations Units
Managers

The Waste Management Operations Units Managers are responsible for the functions listed below.

- Assure that the HWHF is operated in a safe manner, meeting applicable requirements of LBL, Federal, state, local, and QA regulations.
- Assure that the proper work environment exists for HWHF personnel.
- Manage and coordinate maintenance activities for HWHF.
- Manage and coordinate facility activities for the HWHF.
- Assist with safety and control measures for employee and environmental protection during HWHF operations.
- Provide support for the accountability, tracking of documents, and regulatory guidance for the preparation of radioactive and mixed hazardous waste shipments.
- Assure that field operations are carried out in a safe manner, meeting applicable requirements of LBL, DOE, DOT, and other Federal and state regulations.

Continued on next page.

4. Quality Assurance (continued)

Waste Management Compliance Unit Manager

The Waste Management Compliance Unit Manager is responsible for the functions listed below. The Compliance Unit Manager may delegate any or all of the QA program functions to staff members but retains overall management responsibility for such functions.

- Provides technical support to the WM Operations units in emergency planning, compliance issues, computations, RCRA, LLW, certification, procedure writing, record-keeping, computer production, and other major systems activities.
- Identifies WM quality-related problems.
- Initiates, recommends, or provides solutions to WM quality-related problems.
- Provides a method to verify that activities affecting quality in WM have been correctly performed.
- Provides the quality control inspection function for WM.
- Reviews procurement documents for technical content affecting WM.
- Develops quality assurance procedures.
- Provides and maintains a document control system for WM procedures.
- Maintains records as required.
- Assures that safety procedures and standard operating procedures are followed.
- Provides technical input, guidance, and assurance to WM to assure compliance with Federal and state regulations, DOE Orders, and waste management acceptance requirements of treatment/disposal sites.

Continued on next page.

4. Quality Assurance (continued)

Waste
Management
Compliance Unit
Manager
(continued)

- Assumes responsibility for communications, permitting, reporting, and correspondence between LBL and regulatory agencies.
- Prepares reports to comply with DOE Orders and additional regulatory and management requirements as applicable.
- Assures compliance with applicable safety measures.
- Assures that chemical and radioactive waste treated on site is in compliance with the appropriate regulations and DOE Orders.
- Assures compliance with waste treatment and disposal regulations.
- Maintains the status tracking system for nonconformance reports, and monitors the control of nonconforming conditions and status indicators.
- Assures that reports to DOE are generated periodically.
- Trains personnel on computer usage and applications.
- Assists in the review of purchase orders dealing with DOE radioactive waste management facilities.
- Prepares manifests and related shipping documents.
- Provides technical support and expertise to LBL personnel as related to packaging and labeling.
- Inspects waste packaging and loading.
- Assists WM in meeting the radioactive criteria and hazardous waste acceptance criteria for shipments off site to other DOE treatment/disposal facilities.
- Arranges for the shipment and disposal of the Laboratory's hazardous and radioactive waste at Hanford/WIPP facilities.

Continued on next page.

4. Quality Assurance (continued)

All Waste Management Personnel

- Understand LBL organizational responsibilities and authorities as described in the OAP and elsewhere.
- Perform assigned tasks in accordance with OAP requirements as described in the WM Facility Notebook and the HWHF Function Notebook.
- Identify noncompliances or unsafe work practices, and understand and implement (as appropriate) the LBL stop-work policy.
- Identify, and report to management, deficiencies in the OAP or other management systems that hinder the ability to achieve performance objectives.
- Understand the assigned tasks and position description for their position.
- Perform only those assignments for which they have the requisite qualifications, training, and proficiency.
- Effectively apply qualifications and abilities in proficient performance of assigned tasks.
- Perform activities in accordance with approved procedures, instructions, and drawings (when required).
- Continuously assess individual performance to prevent quality problems and identify nonconforming conditions and opportunities for improvement in process or item quality.

4.2.2 *Program*

The QA program is designed to assure the quality and reliability of HWHF activities and that activities are planned, controlled, implemented, maintained, and documented in accordance with the NQA-1-1989 standard, DOE Order 5700.6C, and the LBL OAP (LBL PUB-3111).

4.2.3 *Design Control*

The design and construction of new facilities and the modification of existing facilities are performed in accordance with the design criteria specified in DOE Order 6430.1A [24].

Continued on next page.

4. Quality Assurance (continued)

- 4.2.4
*Procurement
Document Control*   Quality-affecting procurement documents are controlled to assure that the procurement cycle has been implemented effectively.
- 4.2.5
*Instructions,
Procedures, and
Drawings*   Instructions, procedures, and drawings are prepared for each quality-affecting activity to the level of detail necessary to assure that the activity can be performed as required. Waste Management Program procedures are listed in Appendix A.
- 4.2.6
Document Control   The Compliance Unit is responsible for document preparation, review, approval, revision, control, and distribution of documents related to waste disposal operations. Controlled documents include, but are not limited to, the Waste Management QA Plan and implementing procedures.
- 4.2.7
*Control of
Purchased Items
and Services*   Procurement and Work Order Requests are used to assure that materials, equipment, and services important to the EH&S activities are procured to meet specific requirements.
- 4.2.8
*Identification and
Control of Items*   Waste containers, waste samples, and disposal activities are controlled in a manner designed to provide unique container identification, unique sample identification, and tracking and labeling of waste. Procedures governing these activities are listed in Appendix A.
- 4.2.9
*Control of
Processes*   Waste-handling activities are performed in accordance with procedures specified in the relevant certification plans and related implementing procedures. Waste certification is controlled by the applicable waste certification plan requirements.
- 4.2.10
Inspections   Inspections are conducted to verify waste characterization, container adequacy and packaging, and the correctness of records. Procedures for inspection include standards of acceptance and rejection in the form of checklists.
- 4.2.11
Test Control   Tests are performed by HWHF personnel to verify performance of treatment processes and characterization of waste, and to demonstrate container and packaging adequacy.
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Continued on next page.

4. Quality Assurance (continued)

4.2.12 *Control of Measuring and Test Equipment*

Measuring and test equipment used in the waste certification process is calibrated on a schedule recommended by the vendor. In addition, calibration (operational readiness) checks are performed by analysts and technicians before instruments are used. Calibration tags or stickers are attached to instruments and equipment to indicate the last calibration date and the next due date.

All measuring and test equipment will be certified against equipment having known valid relationships to nationally recognized standards, such as the National Institute for Standards and Technology.

Instrument and equipment calibration procedures and records are maintained by the EH&S Division. The Environment Department Manager approves the development and use of calibration procedures and requirements for control of measuring and test equipment for LLW.

4.2.13 *Handling, Storage, and Shipping*

The handling, storage, and shipping of LLW is accomplished in accordance with procedures and instruction specified in the Waste Management Program procedures listed in Appendix A.

4.2.14 *Inspection, Test, and Operating Status*

The inspection, test, and operating status indicators used are in accordance with the requirements specified in the relevant procedures.

4.2.15 *Control of Nonconforming Items*

Nonconforming items can be out-of-specification waste containers, imperfect or malfunctioning test and measurement devices, or other out-of-specification or noncompliance items that could adversely affect waste certification, handling, transportation, or disposal. Items in the HWHF that are identified as nonconforming are segregated and marked until corrected or properly dispositioned (e.g., waste containers that do not meet approved standards, waste that cannot be accepted by the WHC, etc.), as detailed in EH&S Procedure 808, *Nonconformance and Corrective Action Control*.

Continued on next page.

4. Quality Assurance (continued)

4.2.16 *Corrective Action*

The HWHF staff is responsible for taking prompt and appropriate action to prevent the effects of a detected quality problem from spreading. The attendant HWHF staff person notifies the Operations Manager and others whose work is affected, and documents the problem and the corrective action taken when any of the following apply:

- An approved documentation record is changed because of the problem or will be by the corrective action taken;
- The problem is not trivial, and there is a significant probability that it will reoccur; or
- A written agreement (maintenance agreement, vendor specifications, etc.) related to HWHF work, cost, or schedule is affected by the problem or correction.

4.2.17 *Certification Records*

In general, records are retained for the three years at the HWHF and for "lifetime" in the LBL Archives and Records files. However, the Environment Department Head may limit or extend the retention period and may specify methods of disposal.

4.2.18 *Surveillance and Audits*

In accordance with the LBL OAP, all divisions are audited on a rotating basis within a two- to three-year period.

4.3 *QA Program Index*

In compliance with Department of Energy Order 5700.6C [17], WM has selected ASME NQA-1-1989 as the national consensus standard basis of its QA program. Table 4-1 identifies the NQA-1 criteria and the relevant WM QA Plan sections.

Continued on next page.

4. Quality Assurance (continued)

Table 4-1

NQA-1 Criteria and Relevant WM QA Plan Sections

NQA 1 Criterion	WM QA Plan Criterion									
	1	2	3	4	5	6	7	8	9	10
1 Organization	✓								✓	
2 Quality Assurance Program	✓	✓								
3 Design Control						✓*				
4 Procurement Document Control							✓			
5 Instructions, Procedures, & Dwgs.					✓					
6 Document Control				✓						
7 Purchasing Control							✓			
8 ID and Control					✓					
9 Special Processes		✓			✓					
10 Inspection		✓						✓		
11 Test Control								✓		
12 Measuring and Test Equipment					✓					
13 Handling, Shipping, and Storage					✓					
14 Inspection, Test, and Ops Status								✓		
15 Nonconformances			✓							
16 Corrective Action			✓							
17 Records				✓						
18 Audits		✓								✓

*Design control measures do not apply to the Waste Management Program.

5. References

1. Westinghouse Hanford Company, *Hanford Site Radioactive Solid Waste Acceptance Criteria*, Richland, WA, WHC-EP-0063, latest revision
2. Lawrence Berkeley Laboratory, *Waste Management Quality Assurance Plan*, LBL PUB-5352, latest revision
3. Lawrence Berkeley Laboratory, *Guidelines for Generators of Hazardous Chemical Waste at LBL and Guidelines for Generators of Radioactive and Mixed Waste at LBL*, LBL PUB-3092, latest revision
4. Department of Energy (1988), *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C., DOE Order 5820.2A
5. Washington State, *Dangerous Waste Regulations*, Chapter 173-303, Washington Administrative Code, Washington State Department of Ecology, Olympia, WA, latest revision
6. Lawrence Berkeley Laboratory, *Mixed Waste Certification Plan*, LBL PUB-5354, latest revision
7. Lawrence Berkeley Laboratory, *Transuranic Waste Certification Plan*, LBL PUB-5355, latest revision
8. Lawrence Berkeley Laboratory, *Waste Management Plan*, LBL PUB-5352, latest revision
9. Environmental Protection Agency, *Protection of Environment*, Code of Federal Regulations (CFR) 40, Washington, DC
10. Department of Transportation, *Transportation*, Code of Federal Regulations (CFR) 49, Washington, D.C
11. State of California, California Code of Regulations Title 22
12. Lawrence Berkeley Laboratory, *Health and Safety Manual*, LBL PUB-3000, latest revision
13. *Hazardous Waste Certification Plan, Hazardous Waste Handling Facility* (LBL PUB-5356), latest revision
14. *Waste Management Function Notebook and Hazardous Waste Handling Facility Facility Notebook*

Continued on next page.

5. References (continued)

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15. Lawrence Berkeley Laboratory, *Waste Minimization and Pollution Prevention Awareness Plan*, LBL PUB-3106, latest revision
  16. *Guidelines for Waste Accumulation Areas (WAAs) at LBL*, LBL PUB-3093, latest revision
  17. *Medical and Biohazardous Waste Generator's Guide*, LBL PUB-3095, latest revision
  18. Nuclear Regulatory Commission (1991), *Energy*, Title 10, Code of Federal Regulations, Washington, DC
  19. Lawrence Berkeley Laboratory, *Waste Analysis Plan*, Section III of Volume 2A of *Hazardous Waste Treatment and Storage Permit Application for the Lawrence Berkeley Laboratory Hazardous Waste Handling Facility*
  20. American Society for Testing and Materials (1984), *Standard Test Method for Surface Burning Characteristics of Building Materials*, ASTM Standard E-84-84a, Philadelphia, PA
  21. NQA-1-1989, *Quality Assurance Program Requirements for Nuclear Facilities*
  22. Department of Energy (1991), *Quality Assurance*, U.S. Department of Energy, Washington, D.C., DOE Order 5700.6C
  23. LBL PUB-3111, the *LBL Operating and Assurance Program Plan*
  24. Department of Energy (1989), *General Design Criteria*, U.S. Department of Energy, Washington, D.C., DOE Order 6430.1A
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Appendix A

Master Procedure List Waste Management Program

Procedure #Short Title**800-819: Administrative, Vendor Oversight, Quality Control**

803	Document Control
804	Records Management
805	Procedure Development and Revision
808	Nonconformance and Corrective Action Control
810	General Vendor Oversight Policy Statement
811	Oversight Procedures—Onsite Transportation
812	Oversight Procedures—Lab Packing
813	Control of Measuring and Test Equipment
814	Internal Audits and Quality Surveillances
818	Waste Management Training Program Plan

820-825: Work procedures applying to both hazardous and rad waste

820	Characterization Procedures
820.11	Acutely and Extremely Hazardous Waste
820.2	The RMMA Waste Certification Form
821	Sampling Procedure
822	Container Procurement, Receipt, and Control
823	Transfer of Waste from Inadequate Drums

826-859: Procedures applying to radioactive and mixed waste only

826	Basic Health/Safety for Rad Workers
827	Onsite Transportation of Radioactive and Mixed Waste
828	Offsite Transfer of Radioactive and Mixed Waste
829	Radwaste Tracking
830	SDARs
831	Radwaste Documentation/Release Procedures for Shipments to Hanford Burial Site
833	Labeling/Characterization/Segregation of Stored Radwaste
833.1	Processing of Legacy Waste at the HWHF
835	Storage/Inspection of Radwaste at HWHF
840	Compaction of Solid Low-Level Radioactive Waste
840.1	QA Checking of Solid LLW Bags to be Compacted
842	Packaging of Noncompacted Solid Low-Level Radioactive Waste

Appendix A (continued)

Master Procedure List Waste Management Program (p. 2)

<u>Procedure #</u>	<u>Short Title</u>
843	Packing of Induced Metals, Materials, and Equipment
844	Packing of Low-Level Animal Carcasses
845	Packing of Low-Level Absorbed Tritium
846	Packing of Scintillation Vials
847	Solidification of Low-Level Radioactive Waste Liquid
848	Packaging of Low-Level Mixed Waste
855	Packaging of Transuranic Radioactive Waste

860–889: Procedures applying to hazardous waste only

860	Inspection of Commercial TSDFs
861	Manifesting and Shipping
863	Inspections
863.1	Staging of Drums at the HWHF
865	Consolidation Procedure
867	Hazwaste Tracking
868	Release of Hazardous Waste from RMMAs
871	Handling of Bulk Acids
872	Draining and Consolidation of Battery Acid
873	Consolidation of Mercury Wastes
874	Handling of Bulk Caustics
876	Consolidation of PCBs
877	Analysis and Consolidation of Waste Oils
878	Handling of Bulk Coolants
879	Organic Liquids—Flammable
880	Organic Liquids—Halogenated Solvents
881	Consolidation of Asbestos
882	Consolidation of Contaminated Soil
883	Empty Container Disposal

890–899: Emergency Procedures

890	Emergency Procedures
891	Discovery of Explosives or Reactives

Appendix B

Definitions

Dangerous Wastes: Those solid wastes designated in WAC 173-303-070 through 173-303-103 as dangerous or extremely hazardous waste. As used in this chapter, the words "dangerous waste" will refer to the full universe of wastes regulated by this chapter (including dangerous and extremely hazardous waste). (See also "extremely hazardous waste" and "hazardous waste" definitions).

Extremely Hazardous Waste: Those dangerous wastes designated in WAC 173-303-070 through 173-303-103 as extremely hazardous. (See also "dangerous waste" and "hazardous waste" definitions).

Hazardous Wastes: Those solid wastes designated by 40 CFR Part 261, and regulated as hazardous waste by the United States EPA. (See also "dangerous" and "extremely hazardous waste" definitions).

Low-Level Waste: Waste that contains radioactivity and is not classified as high level waste, TRU waste, spent nuclear fuel, or by-product material as defined in DOE Order 5820.2A. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be designated as LLW, provided the concentration of TRU radionuclides is ≤ 100 nCi/g of the waste matrix. The mass of the waste container must not be used in calculating the concentrations of radionuclides in the waste.

Mixed Waste: Radioactive waste (LLW or TRU waste) that is co-contaminated with dangerous waste as defined in WAC 173-303-040.

Transuranic Waste: Without regard to source or form, TRU waste is waste contaminated with alpha-emitting TRU radionuclides with half-lives >20 yr and concentrations >100 nCi/g of the waste matrix. Transuranic radionuclides are radionuclides having an atomic number >92 . In addition to TRU radionuclides, radium sources and ^{233}U in concentrations >100 nCi/g of the waste matrix are designated as TRU waste by Westinghouse Hanford because of hazards similar to TRU waste. The concentration limit (100 nCi/g of waste matrix) for TRU waste applies to the item at the time it is declared waste. Additional processing of the waste (e.g., grouting) cannot be used to dilute the concentration of the fissile material and thereby change its waste designation. The only acceptable methods to be used in reducing the concentration of fissile material in waste packages are approved, permitted decontamination or treatment processes. The mass of the waste container must not be used in calculating the specific activity of the waste.

Packaged TRU waste with a surface dose rate that does not exceed 200mrem/h is designated as contact-handled TRU. Packaged TRU waste with an external dose rate in excess of 200 mrem/h is designated as remote-handled TRU. Radioactive waste with quantities of TRU radionuclides in concentrations of 100 nCi/g of the waste matrix or less is LLW.