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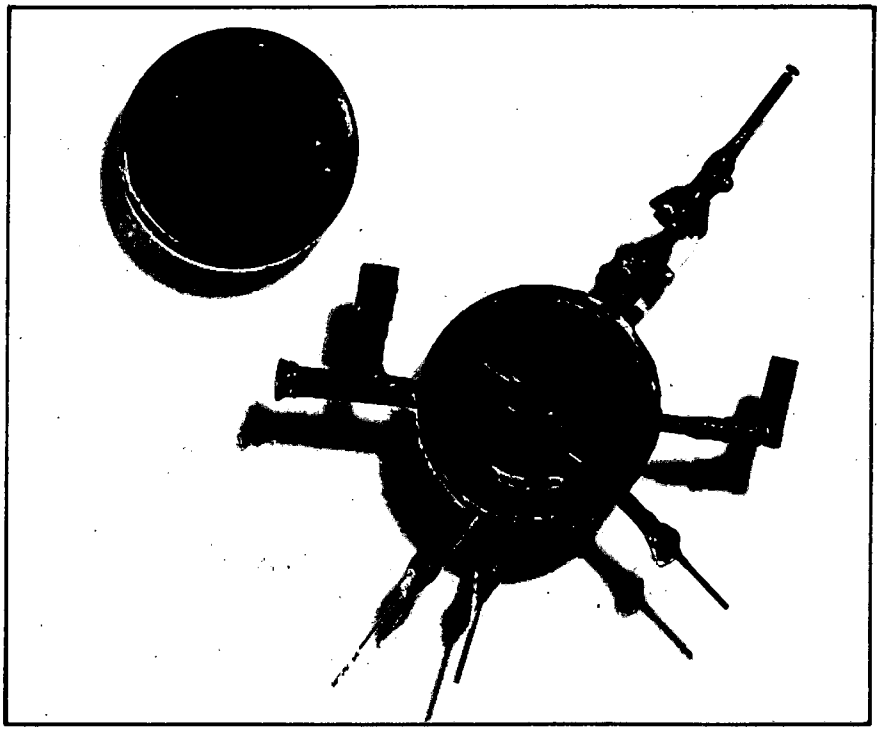
Lawrence Berkeley Laboratory
UNIVERSITY OF CALIFORNIA

ENVIRONMENT, HEALTH AND SAFETY DIVISION

Certification Plan, Transuranic Waste Hazardous Waste Handling Facility

June 1992



Prepared for the U.S. Department of Energy under Contract Number DE-AC03-76SF00098

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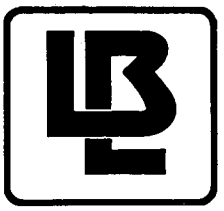

PUB-5355

Certification Plan Transuranic Waste

Hazardous Waste Handling Facility

Environment, Health and Safety Division

Lawrence Berkeley Laboratory

Prepared for the U.S. Department of Energy under Contract No. DE-AC03-76SF00098

PUB-5355

Certification Plan
Transuranic Waste
Hazardous Waste Handling Facility

Environment, Health and Safety Division

Lawrence Berkeley Laboratory

Revision 0
June 30, 1992

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Contents

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Section 1: Introduction

1.1 Purpose

The purpose of this plan is to describe the organization and methodology for the certification of transuranic (TRU) waste handled in the Hazardous Waste Handling Facility (HWHF) at Lawrence Berkeley Laboratory (LBL). For the purposes of this Certification Plan, TRU waste is as defined in the Westinghouse Hanford Company *Hanford Site Radioactive Solid Waste Acceptance Criteria* (WHC-WAC), Sec. 3.1 [1]. This waste is to be transferred to the WHC Hanford Site Central Waste Complex and Burial Grounds in Hanford, Washington, for interim storage pending eventual shipment to the Waste Isolation Pilot Plant (WIPP).

The plan 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; an executive summary of the Quality Assurance Implementing Management Plan (QAIMP) 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 generators, 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. Waste generators have the primary responsibility for the proper characterization of TRU waste. The Waste Certification Specialist verifies and certifies that LBL TRU waste 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 LBL Waste Certification Specialist can verify that the requirements of WHC-WAC are met.

1.2 Scope

This TRU Waste Certification Plan applies to that waste that is TRU waste, is generated by LBL, and becomes the responsibility of the HWHF. This plan is composed to meet the requirements of WHC-WAC and, for newly generated, contact-handled TRU

solid waste streams, the *Plan for Accepting Small Stream Certified Contact-Handled Transuranic Solid Wastes* [2].

This TRU Waste Certification Plan generally follows the suggested outline provided by the WHC letter of April 26, 1990, to Dr. R.H. Thomas, Occupational Health Department Director, LBL.

TRU waste that also contains a dangerous waste (RMW-TRU) as defined in the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code 173-303-040 [3], is addressed in the *Radioactive Mixed Waste Certification Plan* [4] and is not addressed in this Plan. The certification process for low-level waste (LLW) is addressed in the *Low Level Waste Certification Plan* [5].

1.3 Facility Description

1.3.1 *Overall Facility*

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 wastes, including TRU waste.

1.3.2 *Hazardous Waste Handling Facility*

Hazardous wastes, radioactive wastes, and RMW are stored, packaged, and prepared for offsite transport at the HWHF. The HWHF 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.

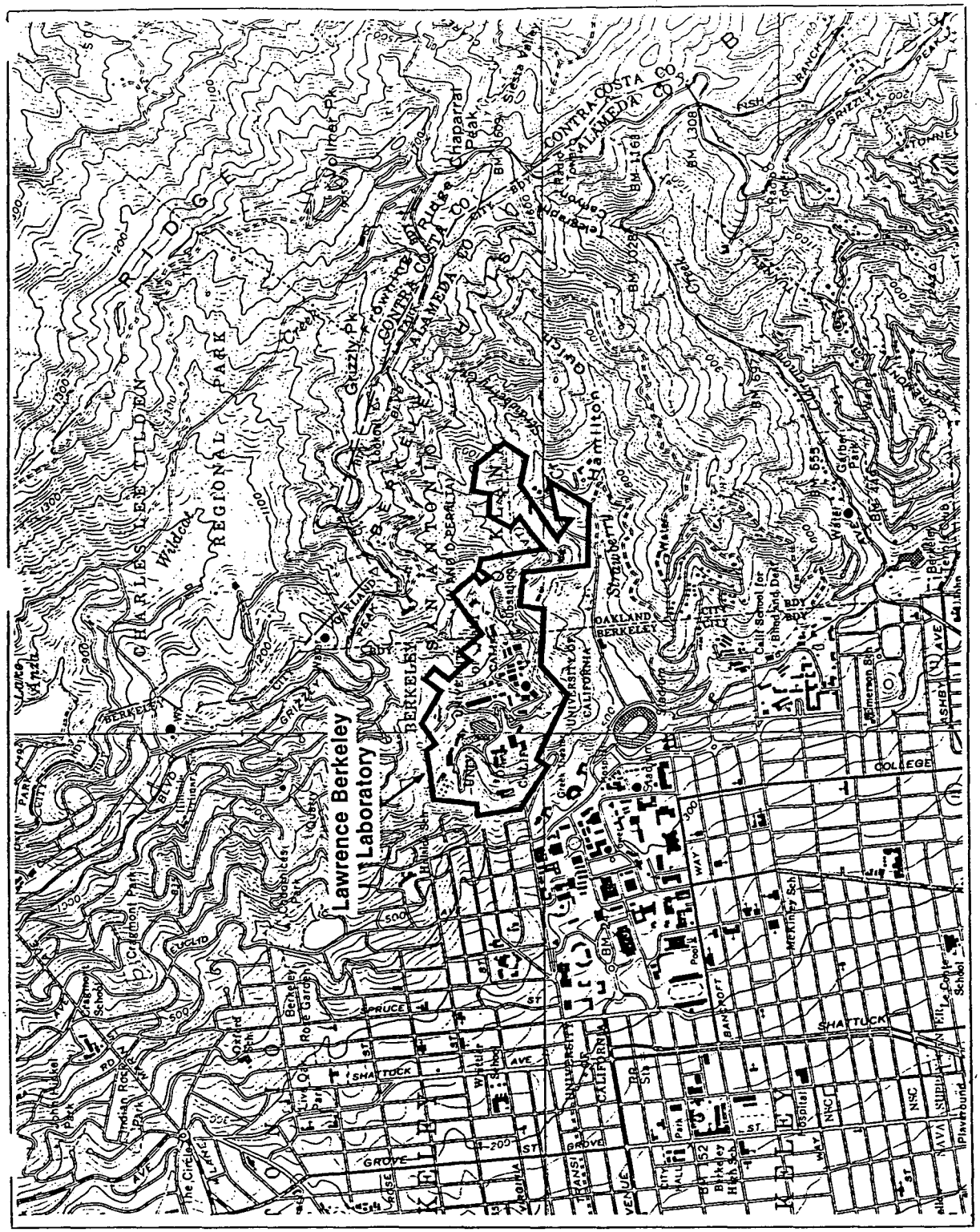

Figure 1-1. Location of LBL in relation to its surroundings

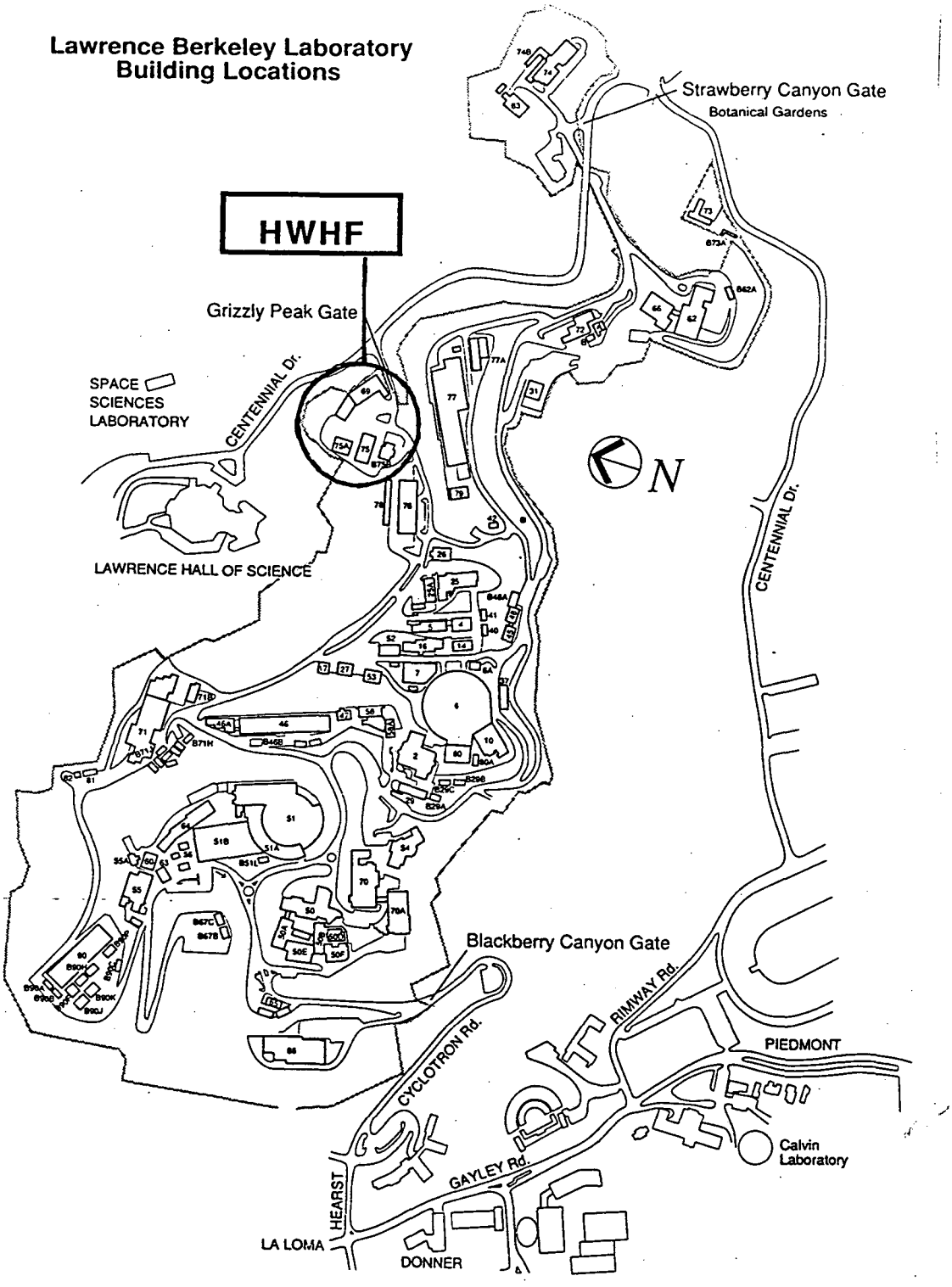

Figure 1-2. LBL site map, showing location of the HWHF

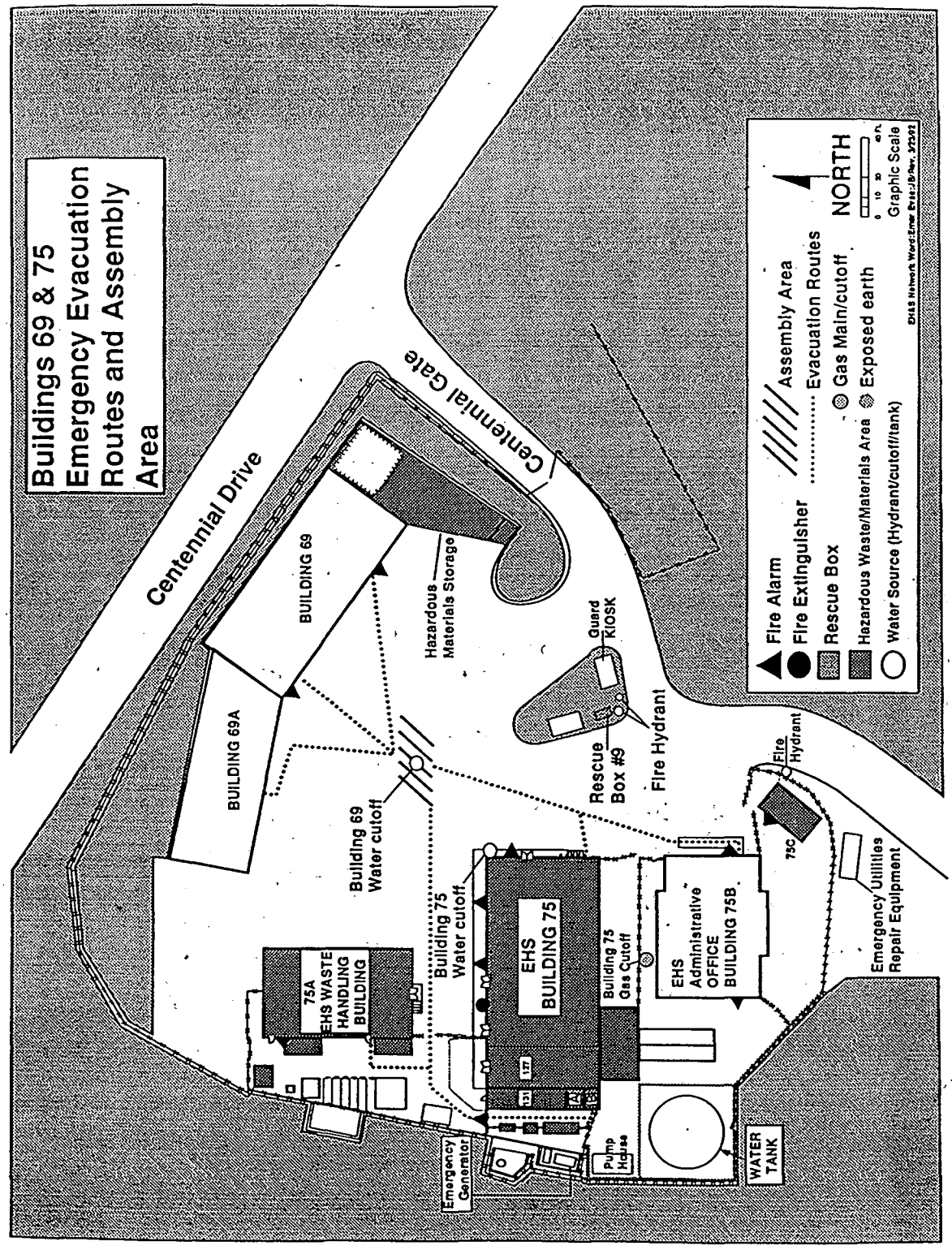

Figure 1-3. HWHF site plan

TRU waste is managed at LBL in accordance with applicable U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), State of California, and Washington State regulations and is packaged and transported to the disposal/storage site in accordance with U.S. Department of Transportation (DOT) regulations. WHC determines whether each request for storage of TRU waste meets its requirements and prepares and issues a Storage/Disposal Approval Record (SDAR). TRU wastes are intended for eventual shipment to the Waste Isolation Pilot Plant in New Mexico, which is not yet available for waste disposal. Any TRU waste shipped to Hanford must also meet the waste acceptance criteria specified in WIPP-DOE-069 [6].

The new HWHF is currently in the design phase and undergoing NEPA/CEQA review. The new facility will consolidate scattered waste-handling operations in one modern facility with enhanced safety and waste-containment functions. A Part B Permit Application is being processed by the California Environmental Protection Agency (Cal-EPA) to cover operations at the new facility and to close the existing one.

LBL researchers generate very small quantities of TRU waste, amounting to approximately one 55-gallon drum containing trace amounts of TRU waste over a three-year period.

1.4 Facility Waste Management Strategy

The Environment, Health, and Safety (EH&S) Division of LBL is responsible for the preparation of the *Waste Management Plan* [7], which governs treatment, storage, and shipment of TRU waste. Individual generators are responsible for the characterization of wastes, including TRU waste, 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* [8]
- EPA regulations: 40 CFR 260-264 [9]

- DOT regulations: 49 CFR 171-173 [10])
- EPA regulations: 40 CFR 761, Subpart B [9]
- Washington State, *Dangerous Waste Regulations*, Washington Administrative Code, Chapter 173-303 [3]
- Title 26, California Administrative Code [11]
- *Hanford Site Radioactive Solid Waste Acceptance Criteria* [1]

The Waste Management Program at LBL is implemented through the following documents, in addition to this TRU Waste Certification Plan:

- LBL Health and Safety Manual, PUB-3000 [12]
- Waste Management procedures (listed in Appendix A)
- *Waste Management Plan* [7]
- Hazardous Waste Management Program, *General Policy Statement*, EH&S Procedure 800
- *Guidelines for Generators of Hazardous Chemical Waste at LBL and Guidelines for Generators of Radioactive and Mixed Waste at LBL* [13] (hereinafter called *Guidelines for Generators*)
- *Waste Minimization and Pollution Prevention Awareness Plan* [14]
- *Waste Management Quality Assurance Implementing Management Plan* [15]

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

Minimization. The *Waste Minimization and Pollution Prevention Awareness Plan* [14] 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* [13] 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 TRU Waste Certification Plan has been established by the HWHF to demonstrate compliance with WHC-WAC [1] for TRU waste. The process for identifying, packaging, labeling, marking, and documenting TRU waste is identified in Section 3 of this TRU Waste 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* [13] has also been issued for use.

Packaging. Waste package criteria are identified in Section 3 for each waste stream. LBL practices for packaging of TRU waste 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 3.11. LBL shipping practices include:

- Transporting TRU waste 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 material transportation regulations (49 CFR) and WHC-WAC [1]

1.4.3 *Waste Disposal QA Program Summary*

A summary of the Waste Management Quality Assurance Implementing Management Plan [15] requirements for TRU waste certification is presented in Section 4. The following are some important requirements of the 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)

1.5 TRU Waste Generation

LBL researchers generate very small quantities of transuranic waste in the radiochemical research laboratories, approximately one 55-gallon drum containing trace amounts of TRU waste over a three-year period. The waste is primarily materials contaminated with alpha-emitting transuranium radionuclides with concentration greater than 100 nCi/g (TRU) as identified in letter JTH/HJJ:247:87 [16]. This TRU waste is in two forms: (1) a newly generated waste stream of contaminated laboratory items that includes small articles of adsorbent paper, metal, plastic, rubber, and glass; and (2) TRU wastes that have been stored for over 20 years, including dried salt crystals or oxide solids contained in laboratory glassware or metal capsules. These stored wastes will be characterized to current standards before they are shipped from LBL. None of the stored waste has free liquids.

Currently, there are ten items of waste in storage at LBL that are considered TRU waste. They are composed of 28.8 curies (Ci) of ^{244}Cm (~356 mg), 5.96 Ci of ^{241}Am (~1.75 mg), 5.3 Ci of ^{238}Pu (~310 mg), and 166 mCi of ^{245}Am (~830 mg). All items are contained either in a glass jar or in welded stainless steel capsules.

Section 2: Organization and Responsibilities

2.1 Description of Facility Organization

The Environment Department of the Environment, Health, and Safety (EH&S) Division has the responsibility for management of TRU waste at LBL. Within the Environment Department, the Operations Unit is responsible for handling and shipping TRU waste. Figure 2-1 shows the organizational chart for the Environment Department, and Figure 2-2 shows the organizational flow for TRU waste. The *Waste Management Plan* [7] defines the minimum standards of operation for the HWHF.

2.2 Duties and Responsibilities

This section lists positions responsible for the management and handling of TRU waste, 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.
- Has overall responsibility for implementation of the Waste Management QAIMP [15] at the HWHF.
- Reviews and approves the Waste Management QAIMP and revisions.

2.2.2 *Department Head, Environment Department*

- Is responsible for directing and monitoring all HWHF operations.

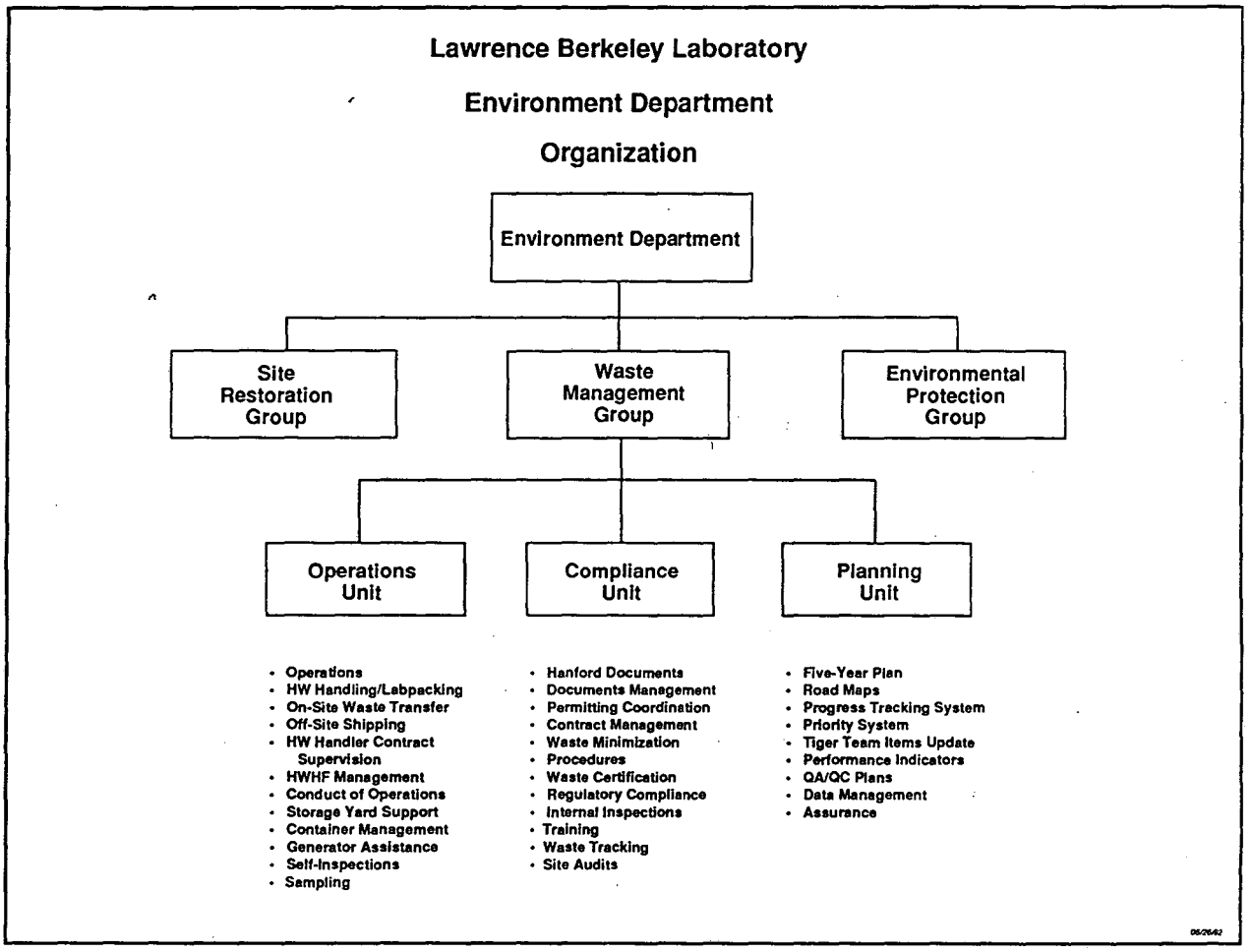

Figure 2-1. Environment Department Organization Chart

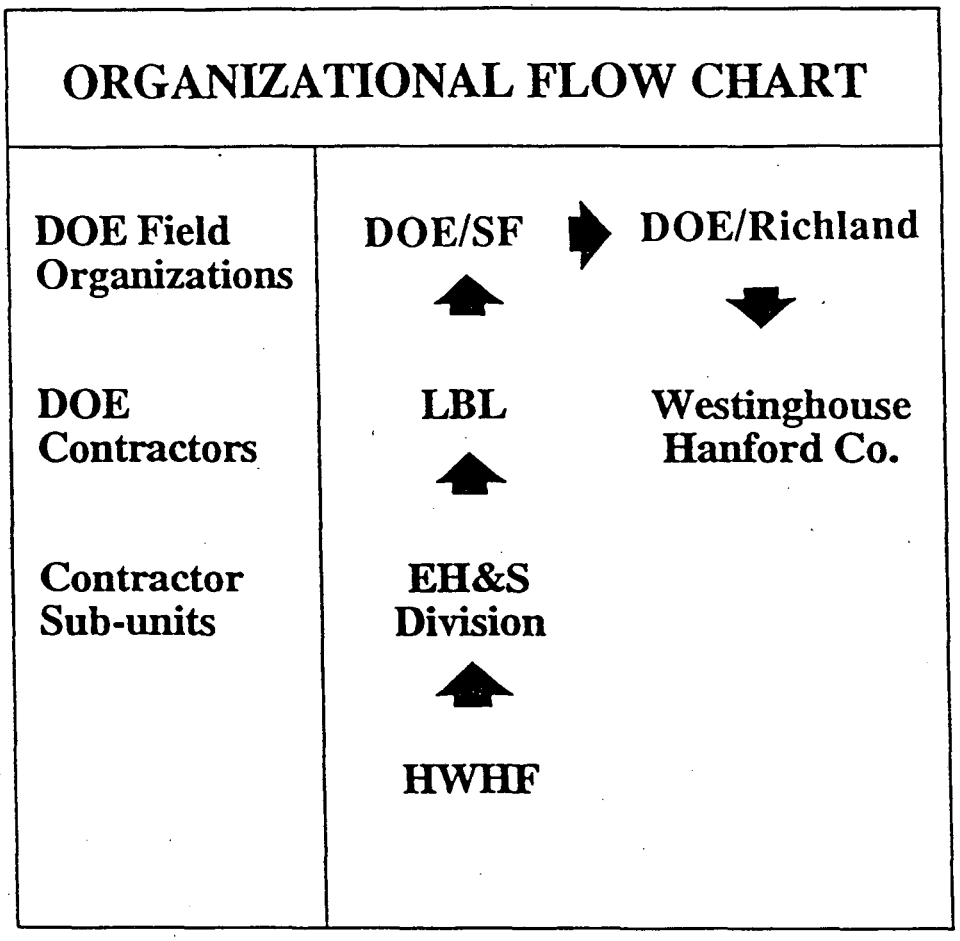

Figure 2-2. Organizational flow for TRU waste

- Is responsible for directing and monitoring the implementation of the HWHF QA program.
- Reviews and approves the Waste Management procedures.
- Assures that waste handling operations are conducted in accordance with the requirements of WHC-WAC [1].
- 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* [7].

2.2.3 *Operations Unit Manager*

- Is responsible for the supervision of TRU waste handling, processing, and transportation.
- Evaluates decontamination and waste disposal work, and issues assignments to Unit members.
- Organizes and trains personnel, and evaluates their performances.
- Is trained in the regulations of WAC 173-303 [3].
- 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 TRU waste.
- 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 in hazardous and radioactive waste processing.

- Prepares for state and Federal audits and inquiries, and responds to various regulatory entities when required.
- 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 QAIMP 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 suppliers that meet DOT requirements, as specified in 49 CFR.

2.2.4 *Senior Technician, HWHF*

- Under limited supervision, collects, identifies, transports, prepares, stores, and disposes of hazardous and radioactive 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.
- Is trained in the regulations of WAC 173-303 [3].
- Improves methods to minimize TRU waste.
- Maintains compliance with all applicable regulations.
- Finds vendors to provide services for disposal, recycling, and transportation of TRU wastes and assures that such services comply with all applicable State of California, Washington State, DOE, and DOT requirements.

- Takes prompt and appropriate action, when necessary, to prevent the effects of a detected quality problem from spreading.
- Subjects TRU waste generated at LBL to minimization and proper packaging for shipment to approved waste disposal sites.
- Evaluates contaminated laboratory equipment and areas, reclaiming where possible by chemical or physical decontamination.
- Maintains up-to-date knowledge of new surface materials, solutions, equipment, and techniques used for decontamination.
- Maintains all required inventories and records associated with the above duties in an accurate, current, and useful format.

2.2.5 *Technician, HWHF*

- Under normal supervision, performs complex duties in the field of radioisotope safety and hazardous and radioactive waste disposal and decontamination to achieve compliance with LBL safety standards and with applicable legal requirements.
- Is trained in the regulations of WAC 173-303 [3].
- Monitors laboratory facilities, equipment, and personnel, decontaminating exposed areas.
- Transports, stores, and disposes of hazardous and radioactive materials.
- 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 supervisor.

2.2.6 *Waste Certification Specialist*

- Signs the certification statement on the Transuranic Waste Storage Record.
- Certifies compliance with waste acceptance criteria in general and with WHC-WAC [1], WIPP-WAC [6], and the relevant SDAR specifically for each waste package.
- Certifies that TRU storage, packaging, waste form criteria, and waste package criteria meet the applicable requirements.
- 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 [3].

2.3 Principal Interfaces

2.3.1 *Internal*

HWHF personnel interface with all generators of TRU wastes 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 TRU waste 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.

Section 3: Certification Methodology

3.1 Certification Process Description

3.1.1 *Requirements*

This plan for certification of TRU waste is designed to ensure that all TRU waste from the LBL HWHF meets the waste acceptance criteria for the Hanford Site Central Waste Complex and Burial Grounds established in WHC-WAC [1] and those established by the Waste Isolation Pilot Plant in WIPP-WAC [6]. The certification methodology addresses the following areas:

- Waste Reduction: LBL imposes technical and administrative controls to minimize TRU waste.
- Waste Segregation: LBL has developed technical and administrative procedures to identify and segregate TRU waste from LLW and 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 Packages and Shipment: All TRU waste packages meet the surface dose, surface contamination, nuclear criticality, thermal power requirements, weight, ^{239}Pu equivalent activity, and gas generation criteria imposed by WHC-WAC and WIPP-WAC.

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

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

3.1.2 *Certification Process Description*

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

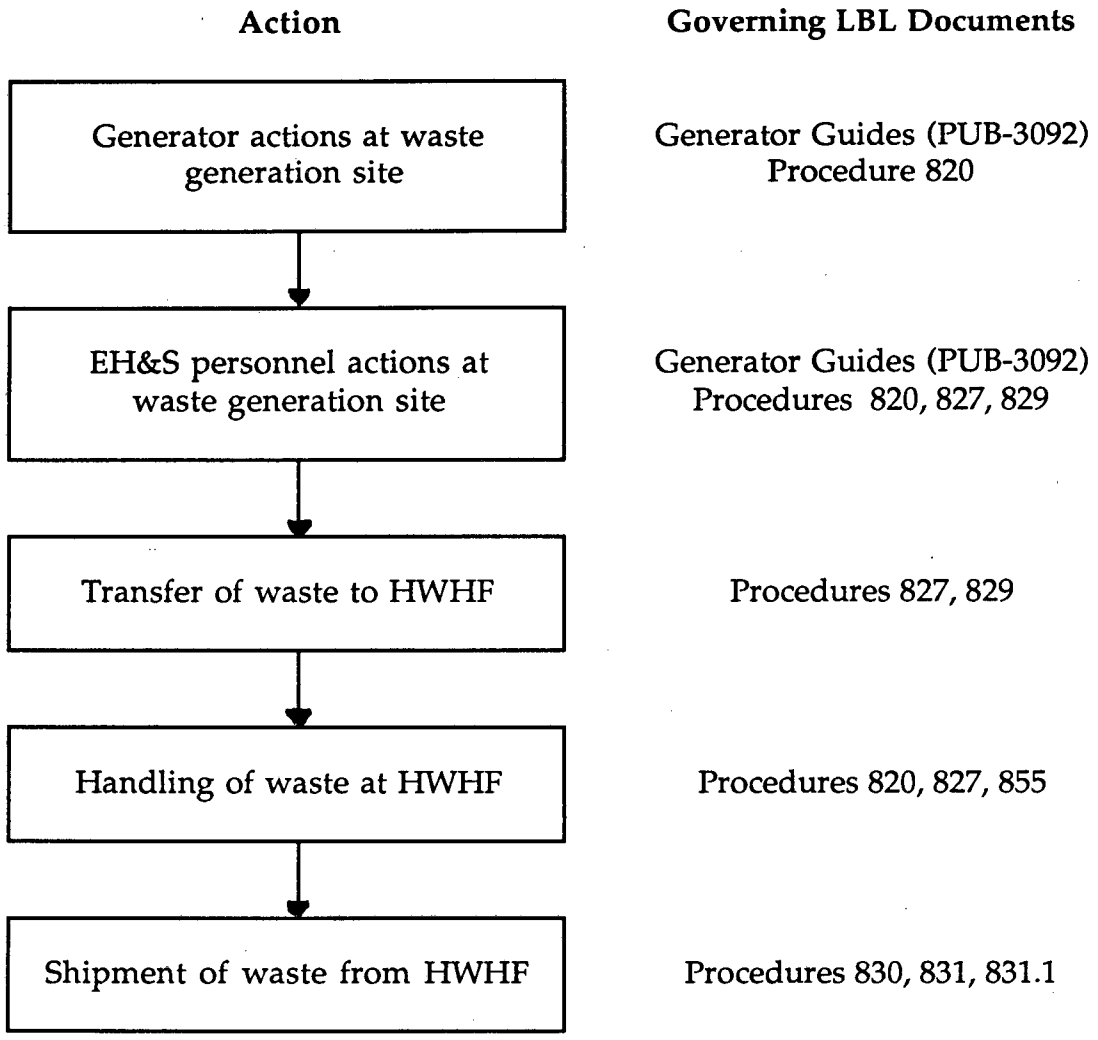

Figure 3-1. Master flow chart for TRU waste at LBL, with governing documents listed.

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

Waste Minimization. LBL has established a series of documents delineating the policy and procedural requirements for generation and control of TRU waste. These documents include

- *Guidelines for Generators* [13]
- Waste Management procedures (Appendix A),
- *General Policy Statement for the Hazardous Waste Management Program* (EH&S Procedure 800)
- LBL *Waste Management Plan* [7]
- *Waste Minimization and Pollution Prevention Awareness Plan* [14]

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 TRU waste material requiring disposal.

TRU wastes are 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*.

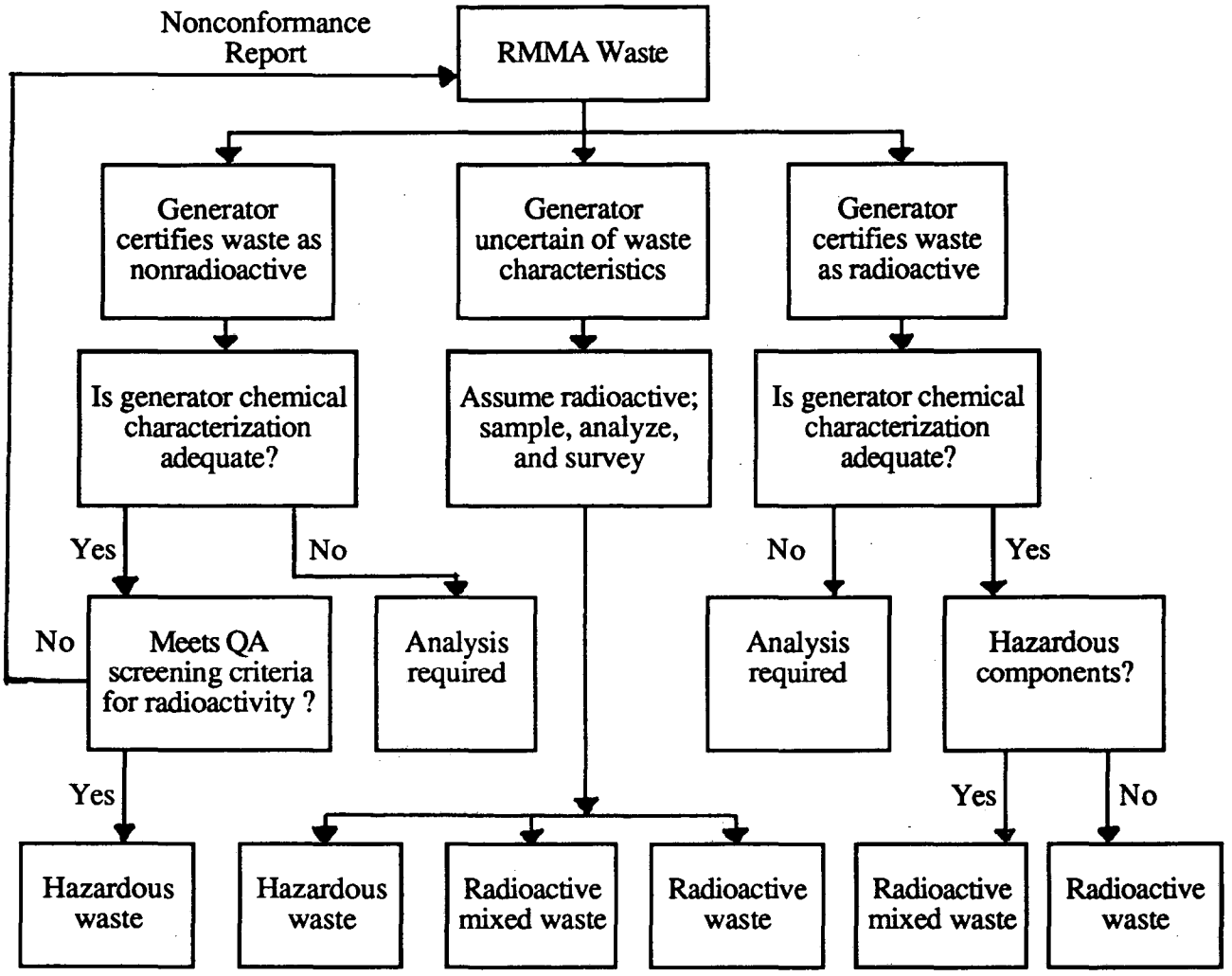

Figure 3-2. Characterization of waste from RMMAs.

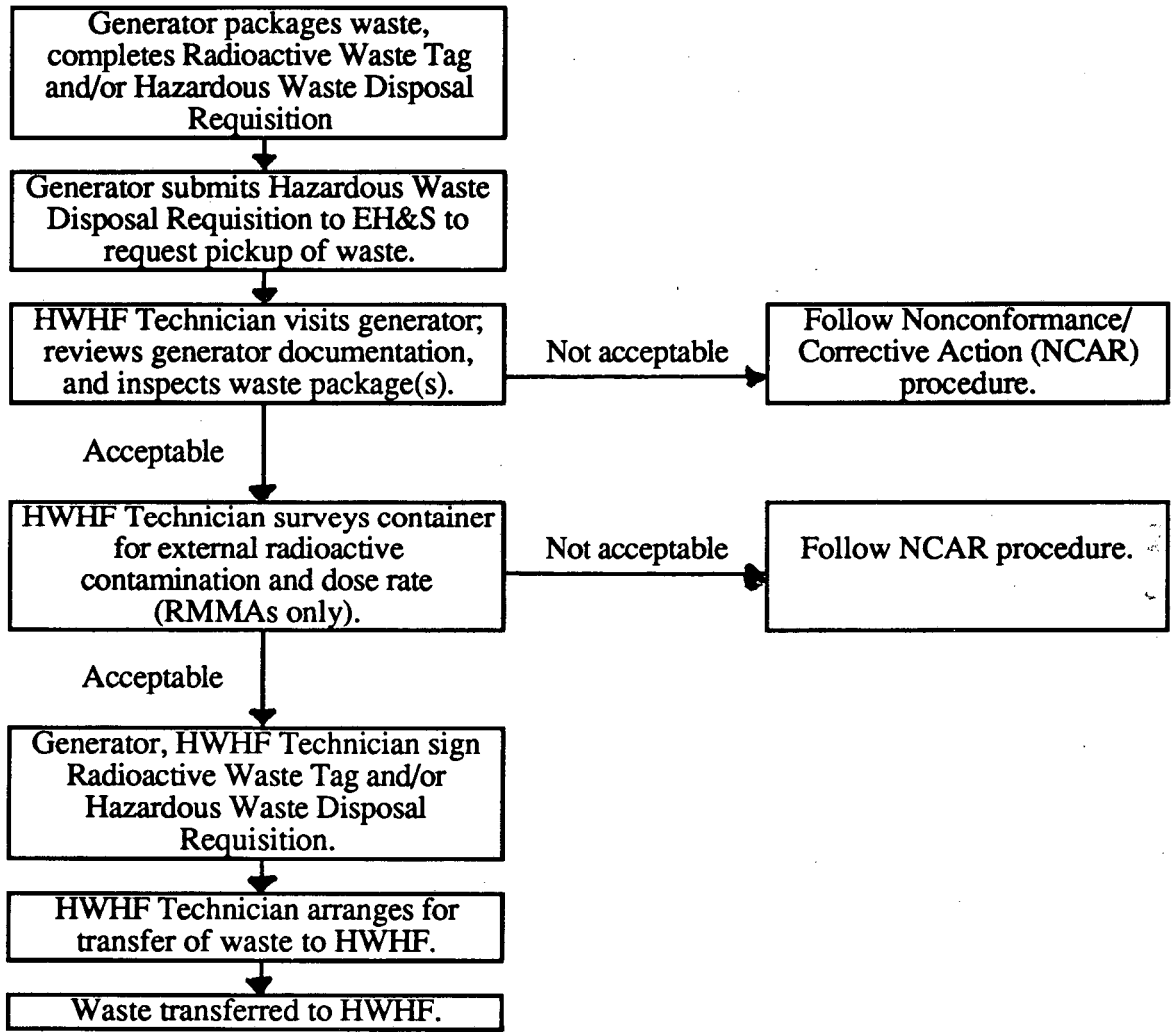

Figure 3-3. Onsite transfer of waste to the HWHF.

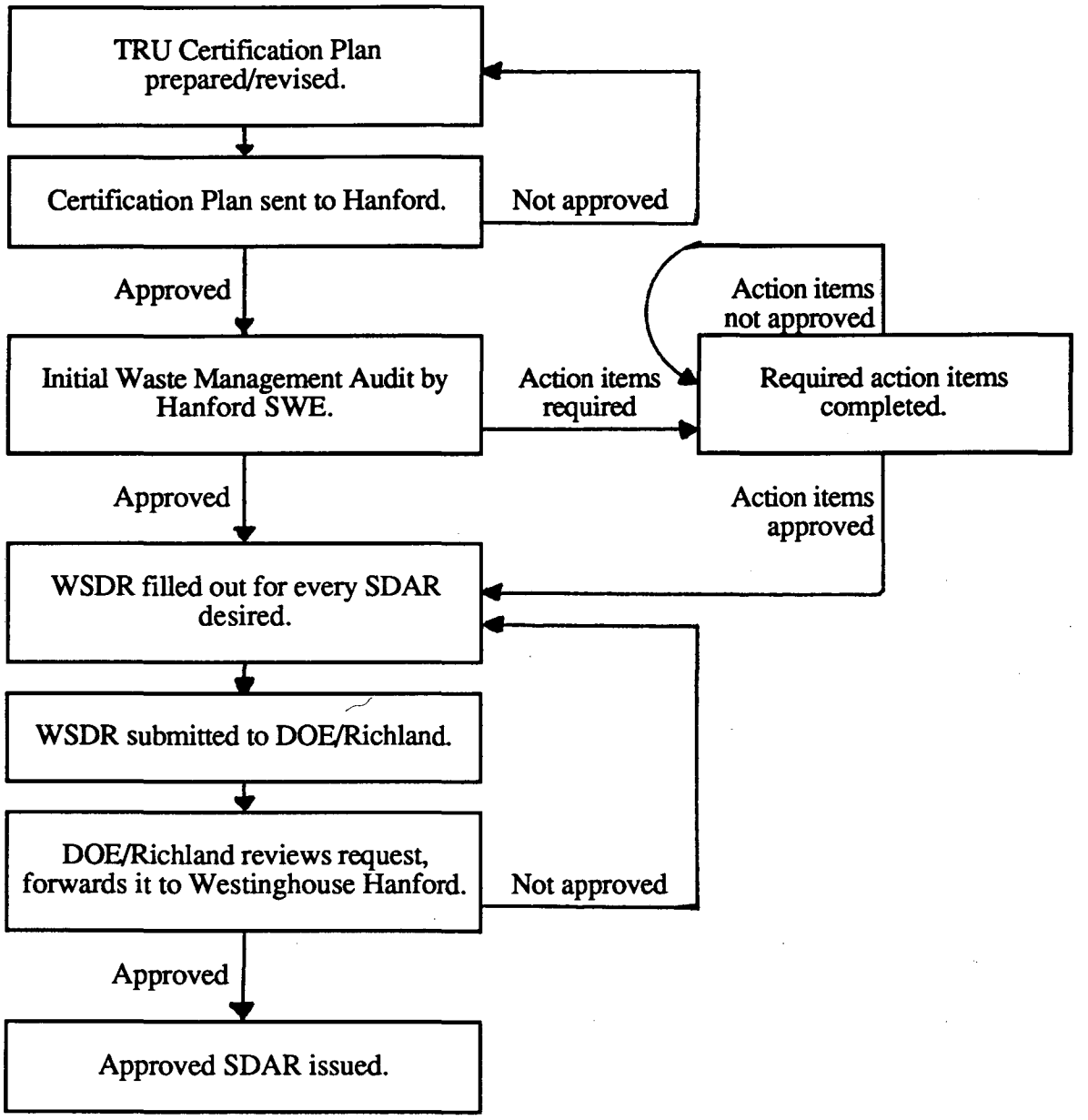

Figure 3-4. Application process for SDARs.

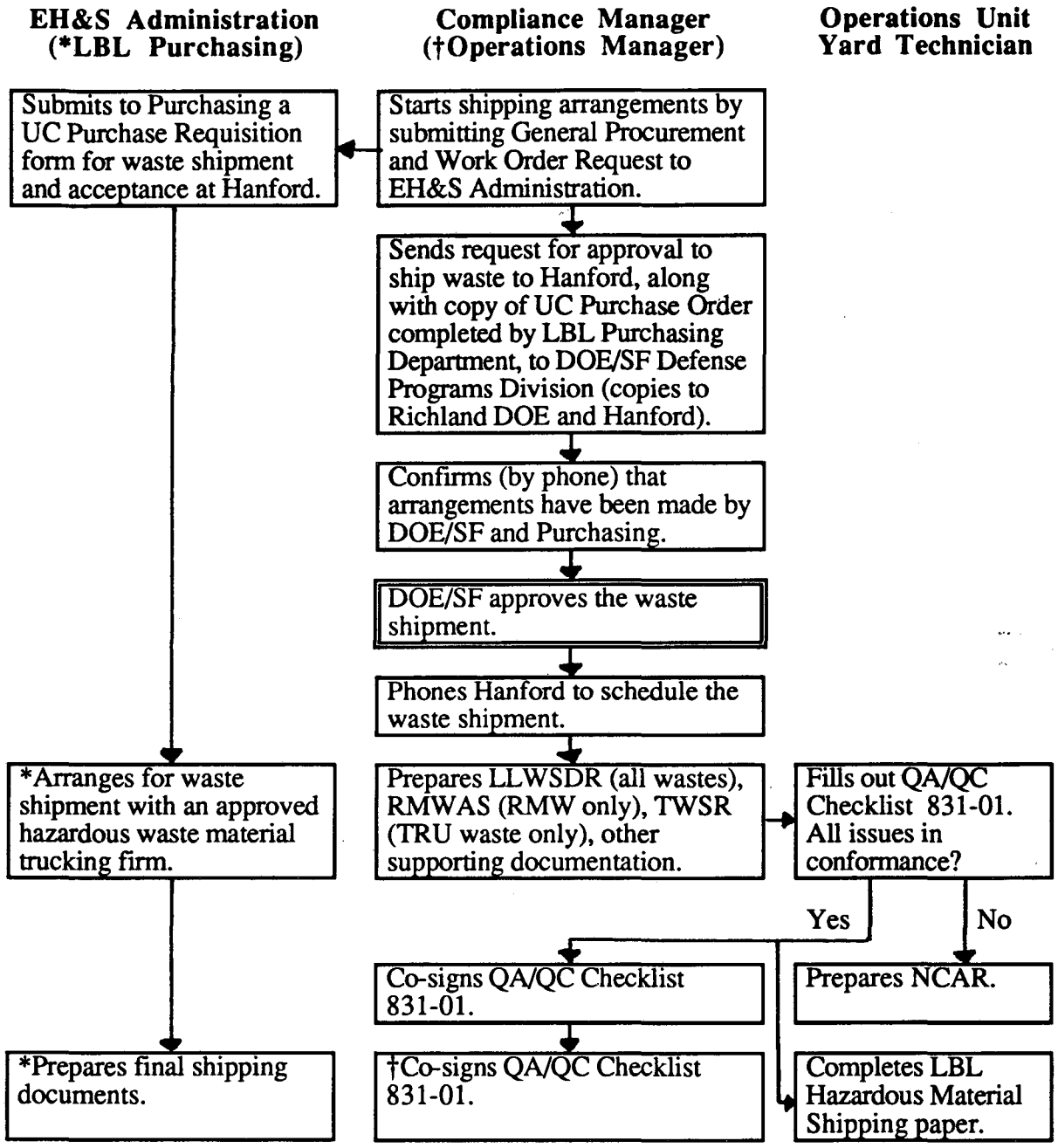

Figure 3-5. Documentation and Release of radioactive waste to Hanford—prior to arrival of truck that will ship the waste.

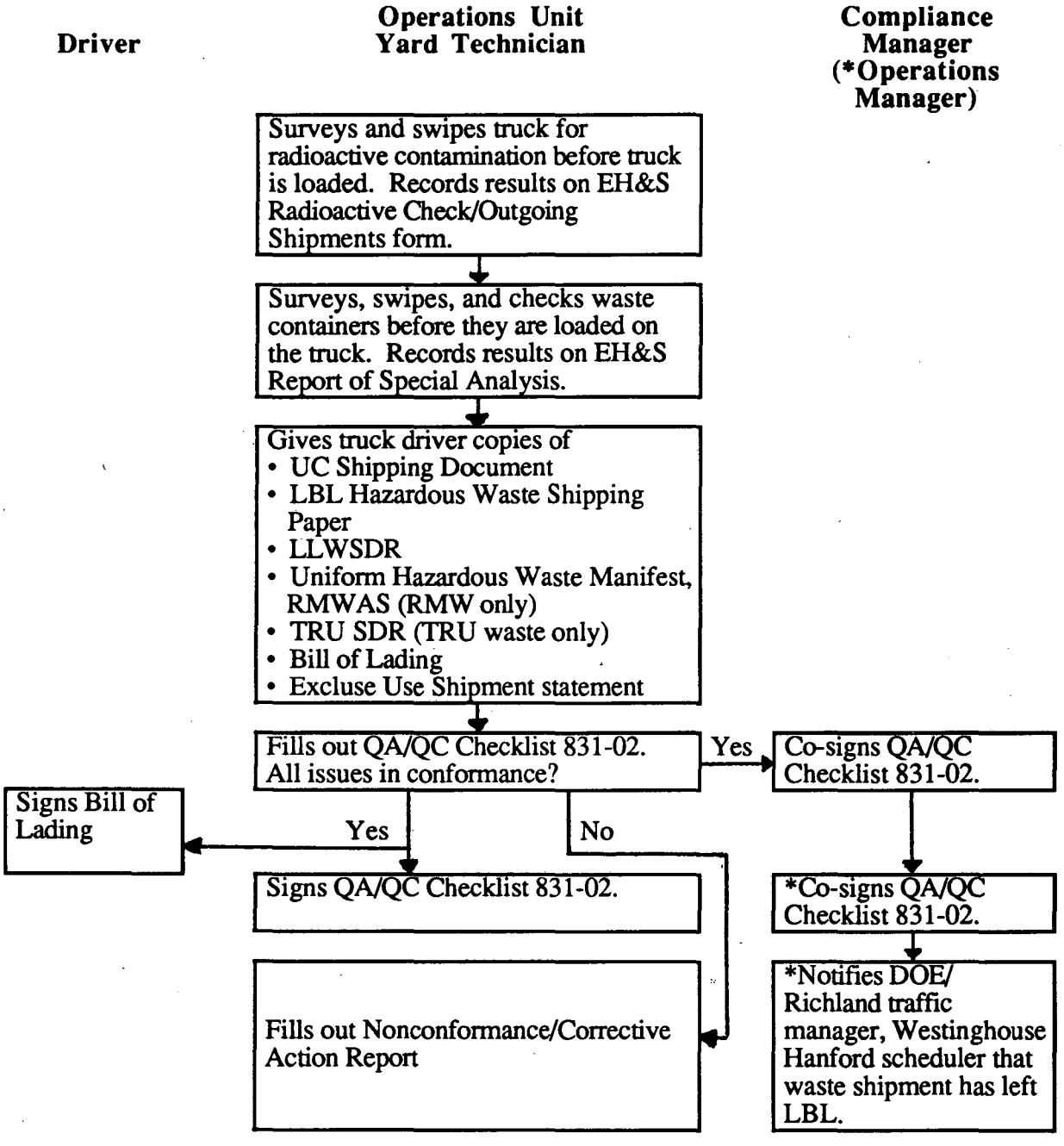

Figure 3-6. Documentation and Release of radioactive waste to Hanford—after arrival of truck that will ship the waste.

To reduce the quantities of TRU waste produced, individual generators are instructed to

- 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 waste (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.

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 [1], specifically Section 3.3, *Waste Characterization.* 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* [13] and specific Waste Management procedures.

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 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 Technician examines each waste package for accuracy before removing it from the user's area.

Physical/Chemical Characterization. Waste certification includes the determination of the physical and chemical characteristics of the waste. 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.

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

- Physical and chemical characteristics of the waste.
- 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).
- Radionuclide distribution, concentration, and activity in waste matrix.
- Method of assay of analysis used to determine radionuclide distribution and concentration.
- Packaging details.
- Packaging date, package weight, and total volume.
- Transportation category (e.g., low specific activity, limited quantity, Type A).

The process of characterization ensures that all of the following criteria are met and documented for TRU waste that is designated for interim storage at Hanford:

- TRU waste is not capable of generating toxic gases, vapors, fumes, or liquids.

- Liquid TRU waste is accepted only if solidified, absorbed, or bound by inert materials. The waste matrix cannot spontaneously combust, explode, undergo liquid desorption, or affect containment barrier integrity.
- Liquid TRU is absorbed or solidified only when approved by WHC.
- Powders, ashes, and similar waste materials are immobilized if more than 1 wt% of the waste matrix is in the form of particles below 10 μm in diameter or if more than 15 wt% is in the form of particles below 200 μm in diameter.
- Waste that is known to be in a powder form or could be transformed to a powder during handling and interim storage or waste in which the proportion of powder is unknown.
- The criteria of the *TRU Waste Acceptance Criteria for the Waste Isolation Pilot Plant,* WIPP-DOE-069 [6] are met.

Waste Handling and Packaging Activities. The certification process involves handling and packaging waste by procedures that assure that the waste is packaged and records generated in a manner that fulfills the requirements of WHC-WAC and the associated 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.

For TRU waste that is designated for interim storage at Hanford, certification assures that all of the following criteria are met and documented:

- Container integrity is ensured.
- Bulky or heavy waste items are blocked inside the container to prevent shifting during handling and transport.
- Sharp corners and edges on waste items are padded to protect the containment barriers, and waste is placed in containers in a manner that will not degrade the service lifetime of the container.

- DOT specification 17C steel 55-gallon drums are used, unless alternate packages are approved.
- Drum interior and exterior surfaces comply with WHC specification HS-V-P-0010-A [1]. For other than 55-gallon drums, the SDAR specifies protective coatings.
- At least two containment barriers are provided, or alternate requirements as specified in the SDAR are met. Requirements for barriers are as specified in WHC-WAC Section 3.4.3.
- Containers meet the handling criteria specified in WHC-WAC Section 3.4.4.
- Containers are noncombustible and meet the general criteria of 49 CFR 173.412 [10] for Type A packaging.
- Surface radiation dose rates meet the requirements of 49 CFR 173.441. Approval by WHC is required before receipt of any contact-handled package that exceeds 100 mrem/h at any point. A neutron dose rate of >20 mrem/h must be reported in the waste package documentation.
- Removable surface contamination does not exceed 111 dpm/100 cm^2 for alpha-emitting TRU waste, and 999 dpm/100 cm^2 for beta/gamma-emitting TRU waste.
- No fixation of surface contamination is allowed.
- The nuclear criticality limits specified in WHC-WAC Section 3.6.3 are met, and each drum contains no more than 3.6 plutonium-equivalent curies, calculated in accordance with Appendix D of WHC-WAC or the limit specified in the SDAR. Fissile material in a single drum also does not exceed 200 ^{239}Pu-equivalent grams or 100 ^{239}Pu-equivalent grams in drums that are lead-lined, contain absorbed liquid organics, or when fissile material takes up less than 20% of the drum volume.
- Thermal power acceptance criteria included in the SDAR are met.

- Catalysts or vents required by the SDAR are properly used, and the drum is equipped with a carbon composite filter to prevent hydrogen gas or pressure buildup.
- All labeling and marking conforms to the requirements in 49 CFR 171, 172, and 173.
- The labeling and marking requirements of WHC-WAC Section 3.7 are met.
  - General criteria of WHC-WAC Section 3.7.1 are met.
  - The character size criteria of WHC-WAC Section 3.7.2 are met.
  - Location criteria of WHC-WAC Section 3.7.3 are met.
- Packages are labeled with the following information:
  - WRM number
  - Package Identification Number (PIN)
  - Gross weight (lbs or kg)
  - DOT "RADIOACTIVE" hazard class label.
- Other specific requirements of WHC-SD-WM-PAP-046, Revision 3, [2] are met.

3.1.3 *Procedures and Processes Common to All Waste Streams*

Qualification and Training. All users of radioactive materials are required to attend the EH&S courses 430 (Radiation Protection), 343 (Hazardous Waste Generators), and 347 (Radioactive and Mixed Waste). Generators who attend courses 343 and 347 receive copies of the *Guidelines for Generators* [13].

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 contained in the Part B Permit Application.

Management Assessment. The Waste Management QAIMP [15] provides the oversight for HWHF certification activities to assure that these activities result in the management of waste in accordance with WHC-WAC [1]. This oversight is accomplished through the use of audits, quality surveillances, and reviews of related activities. Corrective actions and control of nonconforming items are addressed in the Waste Management QAIMP and Section 4 of this document.

HWHF management reviews and assesses these procedures and processes to ensure that the generators characterize the waste adequately and provide adequate environmental, 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.

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 EH&S. 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, etc.) 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.).
- 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 radionuclide releases well below DOE guidelines.

3.2 TRU Waste—Solid

3.2.1 *Description*

LBL researchers generate very small quantities of transuranic waste in the radiochemical research laboratories, approximately one 55-gallon drum containing trace amounts over a three-year period. This TRU waste is in two forms: (1) contaminated laboratory items that include small articles of adsorbent paper, metal, plastic, rubber, and glass; and (2) TRU wastes that have been stored for over 20 years, including dried salt crystals or oxide solids contained in laboratory glassware or metal capsules.

3.2.2 *Characterization Methodology*

Any material that is known to be or suspected of being contaminated with TRU radionuclides is evaluated by assay, laboratory analysis, or process knowledge as soon as possible in the generation process. Waste characterization at the HWHF includes

identification of the radionuclides adequately to satisfy the requirements of WHC-WAC [1]. This includes radionuclide distribution, concentration, and activity in the waste matrix.

LBL personnel using radionuclides are responsible for characterizing the TRU waste generated in their work areas. 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.

3.2.3 *Physical/Chemical Characterization Methodology*

The generator, with assistance from HWHF personnel, reviews the waste to assure the absence of hazardous chemicals as identified in the following:

- 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 is characterized, either by generator certification or by hazard categorization, to verify the absence of the following hazardous waste characteristics:

- Ignitibility, as defined in 40 CFR 261.22;
- Corrosivity, as defined in 40 CFR 261.22;
- Reactivity, as defined in 40 CFR 261.23;
- Toxicity, as defined in 40 CFR 261.24; or
- Biologic (infectious) nature as defined in the California Health and Safety Code, Section 255117.5 [18].

All waste is physically characterized to demonstrate that it meets the specifications required by WHC-WAC [1].

3.2.4 *Waste Segregation Methodology*

TRU waste is segregated into separate waste containers to avoid mixing with other LLW or RMW streams. Certified TRU waste is not commingled with noncertified TRU waste. All TRU wastes are transported separately and comply with the WHC packaging and segregation requirements.

3.2.5 *Waste Handling, Packaging and Shipping Operation*

Solid TRU waste accepted by HWHF is solid in form and does not contain free liquids. Waste suspected of containing free liquids is tested using Method 9095, "Paint Filter Liquid Test," prescribed in EPA/SW-846, *Test Methods for Evaluating Solid Waste* [19].

Solid TRU waste is packaged in 1/2-gallon or smaller ice cream cartons, with lids sealed with 2-inch masking tape. This in turn is placed inside a polyethylene bag sealed with 2-inch masking tape. All materials are identified on the Radioactive Waste tag by composition (e.g., 50% paper, 25% glass, 25% rubber). The waste tags are tied and taped (with 2-inch masking tape) to the sealed plastic bag. The plastic bag is placed inside a 6-inch-diameter by 12-inch-high metal can provided by HWHF. Curie amounts of TRU waste are placed inside a 2R pipe-and-nipple container provided by HWHF. EH&S Procedure 855 contains the details for packaging solid TRU waste.

All TRU waste packages shipped to the Hanford Site 200 Area facilities for storage meet the labeling and marking criteria requirements specified in 49 CFR 171, 172, and 173 [10]. The waste generators are required to complete information required on the Radioactive Waste tag. The procedures and requirements for labeling and marking are provided in *Guidelines for Generators* [13].

Transuranic waste, when shipped offsite, is manifested. The driver is given copies of

- University of California shipping document

- LBL Hazardous Material Shipping Paper (if necessary)
- Transuranic Waste Storage Record
- Contents Inventory Sheet
- WIPP Certification Checklist
- Bill of Lading
- Exclusive Use Shipment Statement

The driver signs the Bill of Lading. Waste manifesting requirements are delineated in EH&S Procedure 831, *Radwaste Documentation/Release Procedures for Shipment to Hanford Burial Site.*

3.3 TRU Waste—Liquid

3.3.1 *Description*

LBL researchers generate very small quantities of transuranic waste in the radiochemical research laboratories, approximately one 55-gallon drum containing trace amounts of solid TRU-waste over a three-year period. Liquid TRU waste may be generated from glove box operations in the future.

3.3.2 *Characterization Methodology*

Any material that is known to be or suspected of being contaminated with TRU radionuclides is evaluated by assay, laboratory analysis, or process knowledge as soon as possible in the generation process. Waste characterization at the HWHF includes identification of the radionuclides adequately to satisfy the requirements of WHC-WAC [1]. This includes radionuclide distribution, concentration, and activity in the waste matrix.

LBL personnel using radionuclides are responsible for characterizing the TRU waste generated in their work areas. 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 assay instruments, and the estimated amounts of activity are determined.

3.3.3 *Physical/Chemical Characterization Methodology*

The generator, with assistance from HWHF personnel, reviews the waste to assure the absence of hazardous chemicals as identified in the following:

- 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 is characterized, either by generator certification or by hazard categorization, to verify the absence of the following hazardous waste characteristics:

- Ignitibility, as defined in 40 CFR 261.22;
- Corrosivity, as defined in 40 CFR 261.22;
- Reactivity, as defined in 40 CFR 261.23;
- Toxicity, as defined in 40 CFR 261.24; or
- Biologic (infectious) nature as defined in the California Health and Safety Code, Section 255117.5 [18].

All waste is physically characterized to demonstrate that it meets the specifications required by WHC-WAC.

3.3.4 *Waste Segregation Methodology*

TRU waste is segregated into separate waste containers to avoid mixing with other LLW or RMW streams. Certified TRU waste is not commingled with noncertified TRU waste. All TRU wastes is transported separately and complies with the WHC packaging and segregation requirements.

3.3.5 *Waste Handling, Packaging and Shipping Operations*

Liquid TRU is evaporated to near dryness inside a glove box. The waste is packaged in LBL glass containers provided by HWHF, with diatomaceous earth or another approved absorbent used as a precaution. The glass containers are then placed in the ice cream cartons with lids sealed with 2-inch masking tape. This in turn is placed inside a polyethylene bag sealed with 2-inch masking tape. All materials are identified on the Radioactive Waste tag by composition (e.g., 50% paper, 25% glass, 25% rubber). The waste tags are tied and taped (with 2-inch masking tape) to the sealed plastic bag. The plastic bag is placed inside a 6-inch-diameter by 12-inch-high metal can provided by HWHF personnel. Curie amounts of TRU waste are placed inside a 2R pipe-and-nipple container provided by HWHF personnel. EH&S Procedure 855 contains the details for packaging liquid TRU waste.

All TRU waste packages shipped to the Hanford Site 200 Areas facilities for storage meet the labeling and marking criteria requirements specified in 49 CFR 171, 172, and 173 [10]. The waste generators are required to complete information required on the Radioactive Waste tag. The procedures and requirements for labeling and marking are provided in the *Guidelines for Generators* [13].

Transuranic waste, when shipped offsite, is manifested. The driver is given copies of

- University of California shipping document
- LBL Hazardous Material Shipping Paper (if necessary)
- Transuranic Waste Storage Record
- Contents Inventory Sheet

- WIPP Certification Checklist
- Bill of Lading
- Exclusive Use Shipment Statement

The driver signs the Bill of Lading. Waste manifesting requirements are delineated in EH&S Procedure 831.

3.4 Minimization

The *Waste Minimization and Pollution Prevention Awareness Plan* [14] 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 QAIMP [15] 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 researches 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, 343, and 347, which include training in waste minimization and disposal procedures.
- Keeping buildup of all wastes to a minimum.

3.5 Segregation

Specific segregation instructions are contained in the *Guidelines for Generators* [13]. TRU waste is treated or segregated to reduce any hazardous waste components, using standardized treatment processes and methods in accordance with the Part B Permit Application. RMW-TRU waste and RMW-LLW are segregated into separate waste containers to avoid mixing with other LLW or TRU streams. All TRU waste is transported separately and complies with WHC-WAC [1] packaging and segregation requirements.

The HWHF establishes the policy and procedures for the minimization and segregation of TRU in the *Waste Minimization and Pollution Prevention Awareness Plan* [14] and the Waste Management Program procedures, listed in Appendix A.

3.6 Onsite Treatment and Storage

Various treatment processes are available. For example, liquid radioactive material will be evaporated in glove-boxes, if practicable, and packaged in LBL-certified containers. The generator is required to chemically, radiologically, and physically characterize the TRU

waste, prior to any waste pickup and transport to the HWHF. The waste is stored at the HWHF in DOE approved 55-gallon drums (17C).

3.7 Waste Characterization, Sampling, and Analysis

TRU sampling and analysis is performed in accordance with recognized industry methods and standards. A compilation of all of the sampling procedures used by the HWHF to characterize radioactive waste is presented in the *Waste Analysis Plan* [17]. Sampling and analysis provide for an accurate representation of the waste in accordance with statistically valid methods. It is the policy of the HWHF that ten percent of the waste packages accepted for disposal are verified by an independent laboratory for the accuracy of information provided on the waste tags. Generators should refer to the *Guidelines for Generators* [13] 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 process are routinely used. This process knowledge is reviewed and approved by the HWHF. Documentation of this process knowledge is a requirement.

3.8 Waste Form Criteria

The waste form criteria for LBL TRU waste are defined in the following subparagraphs.

3.8.1 *Solid Transuranic Waste*

Waste is accepted by EH&S as solid provided that it is solid in form and does not contain free liquids. Waste suspected to contain free liquids is tested using Method 9095, "Paint Filter Liquid Test," prescribed in EPA/SW-846 [19].

LBL TRU waste is made up mainly of material from glove box operations and old radioactive sources in storage. This is composed primarily of ^{244}Cm, ^{241}Am, ^{243}Am, and ^{238}Pu oxides or crystals in a glass jar or welded stainless steel capsules. It is anticipated that most TRU waste will come from neutron sources in the future. Some of the TRU

waste may be glove box items that come directly in contact with TRU material or TRU source materials. This is a small waste stream.

3.8.2 *Liquid Transuranic Waste*

Liquids are accepted by EH&S after they are solidified, absorbed, or otherwise bound in the waste matrix by inert material. The resultant waste matrix is not capable of spontaneous combustion, decomposition, desorption, or explosion nor of affecting the integrity of the containment barriers in any way.

3.8.3 *Immobilization*

Powders, ashes, and similar particulate waste materials are immobilized if more than 1 wt% of the waste matrix is in the form of particles below 10 μm in diameter or if more than 15 wt % is in the form of particles below 200 μm in diameter. Particulate waste materials are immobilized in concrete, glass, or a similar solidified matrix compatible with the chemical nature of the waste.

3.8.4 *Pyrophoric Materials*

No more than 1 wt% of the waste in each package is in pyrophoric form or radionuclides, and these are generally dispersed in the waste. The comprehensive list of pyrophoric materials presented in 49 CFR 173, Subparts D and E [10] is used to identify these materials.

3.8.5 *Explosives and Compressed Gases*

Packages of TRU waste contain no explosives or compressed gases as defined by 49 CFR 173, Subparts C and G [10]. No pressurized vessels are permitted in TRU waste. Pressure vessels (such as aerosol cans and other gas cylinders) are permanently vented.

3.9 Waste Package Criteria

All TRU waste packages accepted for storage by Hanford meet or exceed the criteria listed in the following paragraphs.

3.9.1 *Surface Dose Rates*

Waste packages have a surface dose rate at contact no greater than 200 mrem/h (beta, gamma, and neutron) at any point. Neutron dose rate contributions exceeding 20 mrem/h are reported in the waste package documentation.

HWHF personnel measure surface dose rates according to EH&S Procedure 868. Maximum contact surface dose rates are entered on the Transuranic Waste Storage Record (TWSR). Recorded surface dose rates are dose rates at the highest measured points on the surface of the drum or the box.

3.9.2 *Surface Contamination*

Waste packages have removable surface contamination no greater than 50 pCi/100 cm^2 (111 dpm/100 cm^2) for alpha-emitting radionuclides and no greater than 450 pCi/100 cm^2 (999 dpm/100 cm^2) for beta-gamma emitting radionuclides. Fixation of surface contamination is not allowed.

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

3.9.3 *Nuclear Criticality*

The fissile material content of individual waste packages does not exceed 200 gm of ^{239}Pu fissile gram equivalents for each 55-gallon drum. 100 gm is the maximum allowed in drums that are lead-lined, contain absorbed liquid organics, or where the fissile material takes up less than 20% of the drum volume. An Operations Unit technician performs plutonium-equivalent curie (PE-Ci) calculations on the waste drum in accordance with methods and conversion factors provided in Appendix D of WHC-WAC [1]. No more than 3.6 PE-Ci are contained in any waste drum.

3.9.4 *Thermal Power*

The acceptance criteria for waste packages exceeding 0.1 watt/ft^3 are included in the applicable SDAR. An Operations Unit technician performs calculations for thermal power output in accordance with procedures specified in Appendix D of WHC-WAC. Thermal output of the waste package is determined through the use of documented thermal power measurement or assay-based calculation.

3.9.5 *Gas Generation*

Approved venting devices are required for TRU waste packages, they are used as specified in the applicable SDAR. Liners are provided with positive gas communication to the outer container. Other requirements, as specified in WHC-WAC Section 3.6.5, are followed.

3.9.6 *Interior Void Spaces*

There are no limits on void spaces in TRU waste packages; however, bulky or heavy waste items are blocked inside the container to prevent shifting during handling and transport. If void space filler is used, it is not considered as part of the waste matrix for purposes of calculating radioactive material concentrations.

3.9.7 *Weight*

The following weight requirements apply to all waste packages:

- The gross weight of any waste package does exceed the weight for which the container has been certified in accordance with applicable DOT standards for Type A packaging [10].
- The gross weight of each waste package is reported in the waste package documentation and marked on the waste package.

- The maximum weight of a contact-handled TRU waste package is 800 lb/drum without prior written approval from WHC.

3.9.8 *^{239}Pu-Equivalent Transuranic Activity*

The ^{239}Pu equivalent TRU activity of individual waste packages does not exceed 1,000 PE-Ci. Conversion factors for determining PE-Ci are provided in WHC-WAC, Appendix D [1]. The PE-Ci limit for waste going to the Central Waste Complex may be more restrictive as specified in the applicable SDAR.

3.10 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 TWSR.

Waste containers specifically marked for radioactive application are not used for nonradioactive purposes. Solid waste generated in radiologically controlled areas, 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.

3.10.1 *Types and Specifications*

All 55-gallon drums for storing TRU waste meet DOT specification 17C, as detailed in 49 CFR 178.115 [10], and all interior and exterior surfaces are galvanized in accordance with specification HS-V-P-0010-A [1]. Calculations that involve TRU waste container volume use the value 7.35 ft^3 (or 0.208 m^3) for a 55-gallon drum.

3.10.2 *Procurement*

The procurement process begins with the container type being approved by the HWHF Senior Technician prior to actual procurement. The approval is based upon 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 such compliance. This procurement process is presented in detail in EH&S Procedure 822, *Container Procurement, Receipt, and Control.*

3.10.3 *Receipt and Inspection*

Prior to use of any containers, they are inspected inside and out by a trained HWHF Technician. Inspection is conducted upon receipt or prior to delivery to the field 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, lack of imperfections
- rust and nicks.

The results of this inspection, as well as the name of the person conducting the inspection, is 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 to it integrity. Documentation of tests conducted on the drum to qualify it as a DOE-approved container are filed with the Compliance Group.

3.10.4 *Control*

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

Containers used for packaging and transportation of TRU from LBL to the Hanford Site are controlled to assure that the integrity of the container has not been affected during packaging and handling. TRU waste containers are stored at the HWHF until used. These containers are maintained to avoid adverse influence from weather or other factors concerning their containment capability. Only new containers are used for packaging and transportation of TRU waste to the Hanford Site for storage.

3.10.5 *Containment*

All packages for TRU waste storage provide at least two containment barriers to prevent the release of contamination, for example, a polyethylene liner inside a steel drum or a steel drum inside another steel drum. Inner barriers consist of a sealed (twisted and taped) 10-mil or heavier plastic liner or a 90-mil polyethylene drum liner, and are made of a material compatible with the TRU waste.

3.11 Shipping

3.11.1 *Labeling and Marking*

All contact-handled TRU waste packages shipped to the Hanford Site 200 Area facilities for storage meet the labeling and marking criteria specified in 49 CFR 171, 172, and 173 [10] or the applicable Safety Analysis Report for Packaging.

General labeling and marking criteria for TRU waste packages include the following:

- All labels and markings are permanently applied to the waste package with epoxy-polyamide paint or other approved materials that have a predicted 20-yr life in the expected environment and are compatible with the container and protective coating.

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

- All labels and markings are nonfading and nonsmearing.

  Character size criteria for the package identification number (PIN), WRM number, gross weight, "Liquid Organic Waste," and "Bottom Tier Only," markings are at least 1 in. high. All other characters are legible at 5 ft.

  All markings and labels are placed on the side of the package and aligned with the locking bolt on the drum lid. The PIN, WRM, and gross weight are also placed on the top of the package.

3.11.2 *Packaging*

Packaging for the solid and liquid TRU waste streams is delineated in EH&S Procedure 855.

3.11.3 *Handling*

All TRU waste drums from LBL are provided with permanently attached devices to allow handling by means of a forklift, crane, or similar handling equipment. Pallets may be used to handle the drums and are arranged four to a pallet and banded together.

3.11.4 *Manifests*

Wastes shipped offsite are manifested. The driver is given copies of

(1) University of California shipping document

(2) LBL Hazardous Waste Shipping Paper

(3) Bill of Lading

(4) Exclusive Use Shipment Statement (if necessary)

(5) TWSR

(6) WIPP Contents Inventory Sheet

(7) WIPP Certification Checklist

The driver signs the Bill of Lading. The details for waste manifesting are delineated in EH&S Procedure 831.

3.11.5 *Transportation*

Procedures for transporting TRU waste onsite are detailed in EH&S Procedure 827. TRU waste is not transported from offsite locations to the HWHF.

Onsite Transfers. Type A quantities of radioactive waste are transported in cans 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.

3.12 Certification, Data Collection, and Record-Keeping

3.12.1 *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 and storage, which for TRU waste includes WHC-WAC [1], the Waste Isolation Pilot Plant TRU waste acceptance criteria [6], and WHC-SD-WM-PAP-046, revision 3 [2]. TRU waste is placed in interim storage at the Hanford Site pending eventual shipment to the WIPP.

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

- Identifying the waste, through characterization

- 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 waste

The following sections apply to contact-handled TRU waste accepted for storage at the Hanford Site. All contact-handled TRU solid waste complies with the SDAR applicable to that waste.

The criteria for remote-handled TRU waste packages are not addressed in detail in this Certification Plan. They are developed on a case-by-case basis and provided in the SDAR.

3.12.2 *TRU Waste Generation*

The Waste Certification Specialist certifies that:

- Controls are in place to reduce the gross volume of waste generated.
- Waste reduction techniques, such as process modification, process optimization, materials substitution, decontamination, assay of suspect waste, and new technology development, are being employed.
- Volume reduction techniques approved in the SDAR are implemented.
- TRU waste is routinely segregated in separate containers to avoid mixing with LLW or hazardous waste.

- Commingling of certified and noncertified TRU waste does not occur at LBL.
- TRU waste is managed according to ALARA principles.
- Incompatible waste types are routinely segregated.
- Corrosive wastes are routinely neutralized, rendered noncorrosive, or packaged to ensure that containers will meet Type A packaging at the time of shipment to WIPP.

3.12.3 *TRU Waste Characterization*

- Any material known or suspected to contain TRU radionuclides is routinely evaluated as soon as possible in the generating process to avoid commingling with non-TRU materials.
- Hazardous wastes are not packaged with, or added to, TRU waste streams.
- If there is insufficient process knowledge to characterize the waste, the waste is analyzed using the methods given in Appendix J of WHC-WAC.
- The characterization of LBL waste streams includes:
  - physical and chemical characteristics
  - volume
  - weight
  - radionuclide distribution, concentration, and activity
  - method of assay or analysis used
  - packaging details, including date, weight, and total volume
  - transportation category

3.12.4 *TRU Waste Containers*

- Container integrity is assured against compromise from waste form reactions.
- Containers are noncombustible and meet the requirements of 49 CFR 173.412 for Type A packaging.
- Containers are equipped with a method to prevent hydrogen pressure buildup. as specified in the applicable SDAR.
- All 55-gallon drums meet DOT specification 17C.
- Drum interior and exterior surfaces are galvanized according to WHC specification HS-V-P-0010-A.
- Only 17C drums are used to package TRU waste. Other containers may not be used without prior written approval by WHC.
- Bulky or heavy waste items are blocked inside the container.
- Sharp corners and edges on waste items are padded.
- At least two containment barriers are provided, or as specified in the relevant SDAR. Requirements for barriers are as specified in WHC-WAC Section 3.4.3.

3.12.5 *TRU Waste Form Criteria*

- Powder, ashes, and similar particulate waste materials are immobilized if: (a) more than 1 wt % of the matrix consists of particles less than 10 μm in diameter; or (b) more than 15 wt % of the matrix consists of particles less than 200 μm in diameter. (This applies to incidental dust associated with nonparticulate waste, Portland cement, or desiccants added to absorb liquid or moisture.)
- Waste known to be in powdered form, waste that could be transformed into powder during handling or storage, and waste of unknown powder content, is immobilized.

- TRU waste packages do not contain liquids unless the liquids are solidified, absorbed, or bound by inert materials. The waste matrix cannot spontaneously combust, decompose, explode, undergo desorption, or affect containment barrier integrity.
- If absorption is used, it is performed according to WHC-WAC Section 3.5.2.
- Liquids are not absorbed or solidified, unless approved by WHC.
- Pyrophoric materials present in TRU waste are rendered safe through processing to remove the hazardous properties.
- Waste packages contain no explosives, compressed gases (as defined by 49CFR 173, subparts C and G), or pressurized vessels. Pressure vessels are permanently vented.

3.12.6 *TRU Waste Package Criteria*

- The maximum surface radiation dose rate at contact does not exceed 200 mrem/h at any point. Neutron dose rate contributions of more than 20 mrem/h are reported in the waste package documentation.
- Waste packages that exceed 20 mrem/h at any point must be approved by WHC and documented in the SDAR.
- Removable surface alpha contamination does not exceed 111 dpm/100 cm^2.
- Removable surface beta/gamma contamination does not exceed 999 dpm/100 cm^2.
- There is no fixation of surface contamination on waste packages.
- Nuclear criticality limits specified in WHC-WAC Section 3.6.3 are met.
- Each waste package meets the requirements of 49 CFR 173.442 for heat generation and temperature.

- The thermal output of each waste package is determined by measurement or assay-based calculation.
- Thermal output greater than 0.1 watt/ft^3 is recorded in the waste package documentation.
- Approved venting devices that are required by the SDAR are properly used.
- There are no mixtures of gases or vapors that could significantly reduce the effectiveness of the packaging.
- Any liners other than a plastic bags have positive communication to the outer container.
- Plastic bags are closed using the "twist and tape," "horsetailing," or other method approved in the SDAR.
- Calculations of radioactive material concentrations do not consider void space filler as part of the waste matrix.
- The gross weight of any package does not exceed 800 pounds. This weight is not exceeded unless prior written approval is provided by WHC.
- The ^{239}Pu -equivalent TRU activity of any waste package does not exceed 1000 PE-Ci or the applicable SDAR limit, whichever is less. Fissile material in a single waste drum does not exceed 3.6 ^{239}Pu-equivalent curies. Fissile material in a single drum also does not exceed 200 ^{239}Pu-equivalent grams or 100 grams in drums that are lead-lined, contain absorbed liquid organics, or when the fissile material takes up less than 20% of the drum volume.

3.12.7 *Labeling and Marking*

The Waste Certification Specialist certifies that:

- All labeling and marking conforms to the requirements in 49 CFR 171, 172, and 173.
- The general criteria of WHC-WAC Section 3.7.1 are met.

- The character size criteria of WHC-WAC Section 3.7.2 are met.
- The location criteria of WHC-WAC Section 3.7.3 are met.
- Packages are labeled with the following information:
  - WRM number
  - Package Identification Number (PIN)
  - Gross weight (in lbs or Kg)
  - DOT radioactive hazard class label
  - Additional information as may be required by the SDARs

3.12.8 *Documentation*

The Waste Certification Specialist certifies that the following documentation is prepared accurately and completely for each waste package:

- DOE/NRC 741 form (if the waste contains accountable nuclear material)
- WIPP Contents Inventory Sheet
- WIPP Certification Checksheet
- TWSR

Section 4: Quality Assurance

4.1 QA Organization, Duties, and Responsibilities Summary

The LBL Waste Management Quality Assurance Implementing Management Plan (QAIMP) [15] describes the Quality Assurance organization, duties, and responsibilities for the management of activities required to handle, store, and prepare for shipment TRU waste at LBL. The program has been designed to assure that the requirements of the following are met:

- WHC-WAC [1]
- NQA-1-1989, *Quality Assurance Program Requirements for Nuclear Facilities*
- DOE Order 5700.6C, *Quality Assurance* [20]
- DOE Order 5820.2A, *Radioactive Waste Management* [8]

The Waste Management QAIMP is the written quality assurance program plan required by the Lawrence Berkeley Laboratory Institutional Quality Assurance Program Plan (IQAPP) for EH&S activities related to the HWHF.

4.2 Summary of the Facility Quality Assurance Program

The Waste Management QAIMP establishes the framework and requirements that are met in planning, implementing, documenting, and verifying HWHF activities. The following subsections 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 QAIMP. Figures 4-1 and 2-1 show the organizational relationships of positions.

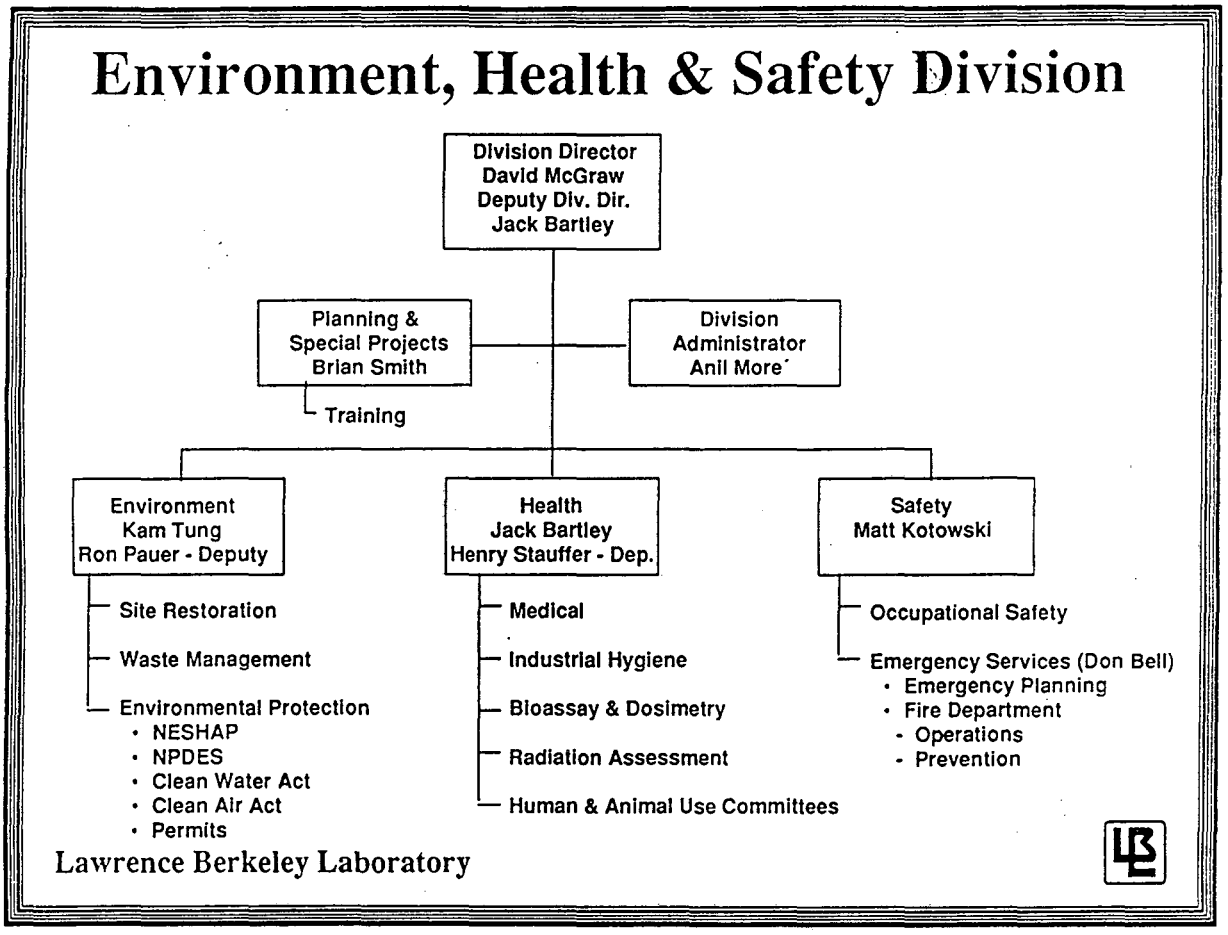

Figure 4-1. EH&S Organization

Functional Responsibilities

Associate Laboratory Director, Scientific and Technical Resources

- Has overall responsibility for the implementation of the QAIMP in the HWHF.
- Ensures resources necessary to implement the QAIMP are provided.
- Approves the use of the QAIMP and any revisions.

Division Director, Environment, Health, and Safety Division

- Is responsible for directing and monitoring the implementation of the QAIMP.
- Reviews and concurs in the use of the QAIMP and any revisions.

Department Manager, Environment Department

- Is responsible for directing and monitoring the HWHF QA program.
- Issues the QAIMP and any revisions.
- Assures audits and reviews are conducted as specified in the QAIMP.
- Assures the necessary corrections, identified as a result of the QA audits and reviews, are accomplished in a timely manner.

Operations Unit Manager

- Is responsible for plans and supervision of the HWHF.
- Evaluates disposal work and issues assignments to members of the unit.
- Organizes training for members of the HWHF as well as LBL waste generators.
- Assures that waste is properly analyzed and that effective methods of minimizing and segregating waste are instituted.

- Assures that waste disposal files are maintained.

EH&S QA Management

- Reviews QA training to ensure that competence is attained as required by the LBL Institutional QA Plan.

EH&S QA Program Personnel

- Assure that quality is achieved and maintained by those who have responsibility for the work.
- Verify achievement of quality.
- May delegate work but not responsibility.
- Have the authority, access, and freedom to identify quality problems; initiate, recommend, or provide solutions to quality problems; verify implementation of solutions; and assure proper disposition of nonconformances or unsatisfactory conditions.
- Have direct access to responsible management levels where appropriate action can be effected.

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.

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 [21].

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 QAIMP 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. Instructions and 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 *Waste Management Plan* [7] and related implementing procedures. Waste certification is controlled by the applicable waste certification plan requirements.

4.2.10 *Inspection*

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 the HWHF to verify performance of treatment processes, characterization of waste, and to demonstrate container and packaging adequacy. Tests are performed according to the DOT regulations and WHC-WAC [1].

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 TRU waste.

4.2.13 *Handling, Storage, and Shipping*

The handling, storage, and shipping of TRU waste 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 will be 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 (i.e., waste containers that do not meet approved standards, waste that cannot be accepted by WHC-WAC, etc.), as detailed in the Waste Management Program procedures listed in Appendix A.

4.2.16 *Corrective Action*

The HWHF staff is responsible for taking prompt and appropriate action to prevent the affects of a detected quality problem from spreading. The attendant HWHF staff person notifies the Operations Unit 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 QA 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, QA records must be retained for the lifetime of the HWHF; however, the Environment Department Manager may limit or extend the retention period and may specify methods of disposal.

4.2.18 *Surveillance and Audits*

In accordance with the LBL IQAPP, 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 QAIMP sections.

Table 4-1. NQA-1 Criteria and Relevant WM QAIMP Sections

NQA 1 Criterion		WM QAIMP 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.

Section 5: References

1. Westinghouse Hanford Company (1991), *Hanford Site Radioactive Solid Waste Acceptance Criteria*, WHC-EP-0063-3.

2. Westinghouse Hanford Company (1991), *Plan for Accepting Small Stream Certified Contact-Handled Transuranic Solid Wastes*, WHC-SD-WM-PAP-046, Rev. 3.

3. Washington State (1991), *Dangerous Waste Regulations*, Chapter 173-303, Washington Administrative Code, Washington State Department of Ecology.

4. Lawrence Berkeley Laboratory (1991), *Radioactive Mixed Waste Certification Plan.*

5. Lawrence Berkeley Laboratory (1991), *Low Level Waste Certification Plan.*

6. Waste Isolation Pilot Plant (1989), *TRU Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, WIPP-DOE-069, Westinghouse Electric Corporation.

7. Lawrence Berkeley Laboratory (1991), *Waste Management Plan.*

8. Department of Energy (1988), *Radioactive Waste Management*, U.S. Department of Energy, DOE Order 5820.2A.

9. Environmental Protection Agency (1991), *Environment*, Code of Federal Regulations, Title 40.

10. Department of Transportation (1991), *Transportation*, Code of Federal Regulations, Title 49.

11. State of California (1991), *Toxics*, California Administrative Code, Title 26, California Code of Regulations.

12. Lawrence Berkeley Laboratory (1990), *Health and Safety Manual*, PUB-3000.

13. Lawrence Berkeley Laboratory (1991), *Guidelines for Generators of Hazardous Chemical Waste at LBL and Guidelines for Generators of Radioactive and Mixed Waste at LBL*, PUB-3092.

14. Lawrence Berkeley Laboratory (1991), *Waste Minimization and Pollution Prevention Awareness Plan.*

15. Lawrence Berkeley Laboratory (1992), *Waste Management Quality Assurance Implementing Manaagement Plan.*

16. Lawrence Berkeley Laboratory (1987), letter from J. Haley and H. Jalonek, LBL, to P.F. Shaw , Rockwell Hanford Operations, dated June 19, 1987, number JTH/HJJ:247:87.

17. Lawrence Berkeley Laboratory (1991), *Waste Analysis Plan, Hazardous Waste Handling Facility, LBL.*

18. State of California (1991), California Health and Safety Code, Division 17, California Code of Regulations.

19. Environmental Protection Agency (1986), *Test Methods for Evaluating Solid Waste (SW-846)*.

20. Department of Energy (1991), Quality Assurance, DOE Order 5700.6C.

21. Department of Energy (1989), *General Design Criteria*, DOE Order 6430.1A.

Appendix A

MASTER PROCEDURE LIST
WASTE MANAGEMENT PROGRAM

Procedure #	Short Title	Old # (if changed)
800–819:	**General, Vendor Oversight, Quality Control**	
800	General Policy Statement (Rev. 1, 3/20/92)	
802	Waste Management Documentation and Guides (Rev. 1, 9/22/92)	
803	Document Control (Rev. 1, 9/22/92)	
804	Records Management (Rev. 1, 9/22/92)	
805	Procedure for Writing Procedures (Rev. 0, 7/17/91)	
808	Nonconformance Control (Rev. 0, 6/3/92)	
810	General Vendor Oversight Policy Statement (Rev. 0, 7/17/91)	
811	Oversight Procedures—Onsite Transportation (Draft, 1/92)*	
812	Oversight Procedures—Lab Packing (Rev. 1, 3/20/92)	
813	Control of Measuring and Test Equipment (Rev. 1, 9/22/92)	
814	Internal Audits and Quality Surveillances (Rev. 1, 9/22/92)	
815	Management Reviews (Self-Assessments) (Rev. 1, 9/22/92)	
818	Waste Management Training Program Plan (Rev. 1, 9/22/92)	
820–825:	**Work procedures applying to both hazardous and rad waste**	
820	Characterization Procedure (Rev. 0, 5/27/92)	806
820.1	Hazard Categorization (Draft, 7/92)	806.1
821	Sampling Procedure (Draft, 7/92)	816
822	Container Procurement, Receipt, and Control (Draft, 1/92)	807
823	Transfer of Waste from Inadequate Drums (Draft, 6/92)	817
826–859:	**Procedures applying to radioactive and mixed waste only**	
826	Basic Health/Safety for rad workers (Draft, 9/92)	820–827
827	Onsite Transportation of Radioactive Waste (Rev. 1, 9/22/92)	809
828	Offsite Transfer of Radioactive Waste (Rev. 1, 9/22/92)	809.1
829	Radwaste Tracking (Rev. 0, 6/15/92)	
830	SDARs (Rev. 0, 6/15/92)	
831	Radwaste Documentation/Release Procedures for Shipments to Hanford Burial Site (Rev. 0, 5/27/92)	
831.1	Instructions on Filling Out SWS/DRs (Rev. 0, 6/15/92)	
833	Labeling/Characterization/Segregation of Stored Radwaste (Draft, 1/92)	
835	Storage/Inspection of Radwaste at HWHF (Draft, 7/92)	
840	Compaction of Solid Low-Level Radioactive Waste (Rev. 1, 6/15/92)	
841	Packaging of Noncompacted Solid Low-Level Radioactive Waste (Rev. 0, 6/15/92)	
842	Packaging of Noncompacted Solid Low-Level Radioactive Waste—Wooden Boxes (Rev. 0, 6/15/92)	

* Final version awaiting Part B Permit approval.

NOTE: All procedures have been implemented; procedures implemented in draft form are still undergoing independent review or field testing.

Appendix A (Continued)

MASTER PROCEDURE LIST
WASTE MANAGEMENT PROGRAM (p. 2)

Procedure #	Short Title	Old # (if changed)
843	Packing of Induced Metals, Materials, and Equipment (Rev. 0, 6/15/92)	
844	Packing of Low-Level Animal Carcasses (Rev. 0, 6/15/92)	
845	Packing of Low-Level Absorbed Tritium (Rev. 0, 6/15/92)	
846	Scintillation Vial Crushing (Rev. 1, 9/22/92)	
847	Solidification of Low-Level Radioactive Waste Liquid (Rev. 1, 6/15/92)	
848	Consolidation Procedure—Low-Level Radioactive Mixed Waste (Draft, 6/92)	
855	Packaging of Transuranic Radioactive Waste (Draft, 6/92)	
860–889:	**Procedures applying to hazardous waste only**	
861	Manifesting and Shipping (Rev. 1, 5/27/92)	
862	Waste Container Request, Issuance, and Control (Draft, 1/92)	
863	Inspections (Draft, 1/92)	
865	Consolidation Procedure (Rev. 0, 2/20/92)	
867	Hazwaste Tracking (Rev. 0, 5/27/92)	
868	Release of RCRA/TSCA Waste from Uncontrolled Areas (Rev. 0, 5/27/92)	838
868.1	Release of RCRA/TSCA Waste (unknown origin) from HWHF (Rev. 0, 5/27/92)	838.1
[708	Release of Materials/Equipment from RMMAs (Rev. 0, 5/27/92)]	
871	Handling of Bulk Acids (Draft, 1/92)*	
872	Draining and Consolidation of Battery Acid (Draft, 1/92)*	
873	Consolidation of Mercury Wastes (Draft, 1/92)*	
874	Handling of Bulk Caustics (Draft, 1/92)*	
876	Consolidation of PCBs (Draft, 1/92)*	
877	Analysis and Consolidation of Waste Oils (Draft, 1/92)*	
878	Handling of Bulk Coolants (Draft, 1/92)*	
879	Organic Liquids—Flammable (Draft, 1/92)*	
880	Organic Liquids—Halogenated Solvents (Draft, 1/92)*	
881	Consolidation of Asbestos (Draft, 1/92)*	
882	Consolidation of Contaminated Soil (Draft, 1/92)*	
890–899:	**Emergency Procedures**	
890	Emergency Procedures (Draft, 1/92)*	801

* Final version awaiting Part B Permit approval.

Appendix B

Definitions

Dangerous Wastes: Dangerous wastes means those solid wastes designated in WAC 173-303-070 through 173-303-103 (Washington State 1989) as dangerous or extremely hazardous waste. As used in this chapter, the words "dangerous waste" refers 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: Extremely hazardous waste means those dangerous wastes designated in WAC 173-303-070 through 173-303-103 (Washington State 1989) as extremely hazardous. (See also "dangerous waste" and "hazardous waste" definitions).

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

Low-Level Waste: Low-level waste is 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 Orders 5820.2A and 5400.3. 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 $\leq$100 nCi/g of the waste matrix. The mass of the waste container shall not be used in calculating the concentrations of radionuclides in the waste.

Radioactive Mixed Waste: Radioactive mixed waste is radioactive waste (LLW or TRU waste) that is co-contaminated with dangerous waste as defined in WAC 173-303-040(18) (Washington State 1989).

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 shall 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 wastes with quantities of TRU radionuclides in concentrations of 100 nCi/g of the waste matrix or less is LLW.

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