

**Environmental Protection Department
Radioactive and Hazardous Waste Management
Division**

Waste Acceptance Criteria

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Lawrence Livermore National Laboratory

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Acronyms:

CCR	California Code of Regulations
CEDE	Committed Effected Dose Equivalent
CFR	Code of Federal Regulations
CHEW	Chemical Exchange Warehouse
CWAA	Consolidation Waste Accumulation Area
DEA	Drug Enforcement Agency
Dep-U	Depleted Uranium
DOE	Department of Energy
DOT	Department of Transportation
DSA	Documented Safety Analysis
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
ES&H	Environment, Safety & Health
GTCC	Greater-than-Class C
HEPA	High Efficiency Particulate Air
IGT	Information Gathering Tool
LLNL	Lawrence Livermore National Laboratory
LSA	Low Specific Activity
LLW	Low-Level Waste
LWRP	Livermore Waster Reclamation Plant
MBA	Materials Balance Area
Nat-U	Natural-Uranium
NORM	Naturally occurring radioactive material
PATS	Packaging and Transportation Safety Committee
PCBs	Polychlorinated Biphenyls
PE-Ci	Plutonium Equivalent-Curie
PIW	Process Information Worksheet
PKE	Process Knowledge Evaluation
RCRA	Resource Conservation and Recovery Act
RHWM	Radioactive and Hazardous Waste Management
RMMA	Radioactive Materials Management Area

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RWMB	Radioactive Waste Management Basis
SAA	Satellite Accumulation Area
SAR	Safety Analysis Report
SCIL	Single Container Inventory Limits
TSDF	Treatment Storage & Disposal Facility
TRU	Transuranic
TSR	Technical Safety Requirements
USQ	Unreviewed Safety Question
VOCs	Volatile Organic Compounds
WAA	Waste Accumulation Areas
WAC	Waste Acceptance Criteria
WCP	Waste Certification Program
WDR	Waste Disposal Requisition
WGS	Waste Generator Services
WIPP	Waste Isolation Pilot Plant

Summary

This Waste Acceptance Criteria (WAC) Manual is intended to provide guidance to Lawrence Livermore National Laboratory's (LLNL) waste generators in the management of their waste as well as comply with the requirements of State and Federal regulations and the Department of Energy (DOE) Order 435.1.

The WAC Manual does not contain new information; it is a summary of information from other documents and guidance materials.

Note: The reference numbers in superscript associated with text in the document refer to the reference from which the information was derived. The references are at the end of the document.

Introduction

The Radioactive and Hazardous Waste Management (RHWM) Division is a service organization that exists to assist you in safely disposing of waste that you generate as part of your work activities. To fulfill this role, RHWM operates several facilities in both the southeastern and northeastern quadrants at the Lawrence Livermore National Laboratory (LLNL). These facilities are regulated by both the California Department of Toxic Substances Control for hazardous wastes and by the Department of Energy for radioactive wastes. These regulators provide RHWM with requirements that must be met to fulfill LLNL agreements with them. Many of the Waste Acceptance Criteria (WAC) requirements with which we, and you, must comply, are driven by our regulators, while others exist because we need to ship your waste off site. All off site facilities have their own waste acceptance criteria, and their needs are reflected in this WAC where possible.

Your cooperation in complying with this WAC is also critically important to the safety of RHWM employees who will manage your waste after we receive it. All of us in RHWM Division appreciate your cooperation.

Your most important responsibility as a waste generator is to identify what your waste is – What is it? How much is there? What process caused it to be generated? These requirements are outlined in Appendix D of Document 2.1 of the LLNL ES&H Manual. We suggest that you become familiar with that Section of the Manual as well as this document.

1.1 Purpose

The purpose of this LLNL WAC document is to summarize requirements for waste generators and to provide the generator with general guidance for acceptance of the types of waste managed at LLNL.

Radioactive and Hazardous Waste Management (RHWM), a division of the Environmental Protection Department (EPD), has developed and prepared this WAC document to help you, as a LLNL waste generator, meet all regulatory and permit requirements.

RHWM's goal is to provide uniform acceptance criteria for waste that you send to its facilities for storage, treatment, and/or offsite disposal.

1.2 Scope

The primary scope of the WAC is the acceptance guidance by RHWM of waste generated at LLNL to ensure compliance with the Hazardous Waste Facility Permit, Operation Plan and the nuclear facility Documented Safety Analysis (DSA) governing RHWM waste management facilities. The WAC also provides guidance on the general management of waste at LLNL.

1.3 Exceptions to the WAC

Exceptions to these acceptance criteria may be granted in certain cases. The process to obtain an exception is determined by the source and type of the requirements from which the specific acceptance criterion is derived. These requirements fall into three categories, each having a specific approval process, as described in the following sections.

A generator can request an exception from one or more of the criteria in this document. The request must be in writing to the RHWM acceptance organization (RHWM Division Leader). The request must identify the specific requirement(s) in this document for which an exception is desired, the reason an exception is needed, and any proposed alternative methods to meet the general intent of the requirement.

RHWM will review the exception request and determine the appropriate category and approval process, based on the background documentation for these acceptance criteria. This documentation identifies the source(s) of each requirement so a determination can be made whether an exception could be approved by RHWM, or whether Department of Energy (DOE) and/or regulatory agency approvals are required. On completion of this review, RHWM will respond in writing, identifying whether the exception is granted, rejected, or requires further evaluation or clarification.

1.3.1 RHWM-Approved Exceptions

An exception can be granted to these acceptance criteria when RHWM demonstrates that the exception does not affect compliance with (1) any applicable regulations and (2) any DOE and/or regulatory agency-approved requirements documents.

RHWM documents that the exception being granted does not affect compliance with any applicable regulations or any of the externally approved documents.

1.3.2 DOE-Approved Exceptions

Exceptions to acceptance criteria that could affect compliance with a DOE-approved requirement document (for example, safety basis) or DOE Orders will require a DOE waiver, DOE approval of a safety document revision, or other DOE approval. For this type of exception, the appropriate waiver request, document revision, or other applicable request for approval will be submitted to RHWM by the generator. The generator can request assistance from RHWM anytime during this process.

1.3.3 Regulatory Agency-Approved Exceptions

Exceptions to acceptance criteria that could affect compliance with regulations, permit conditions, compliance orders, or other requirements imposed by a regulatory agency must be submitted by DOE or LLNL to the affected regulatory agency(s). The document requesting the exemption will be prepared by EPD personnel, with input from the generator.

1.4 Radioactive Waste Management Basis

The implementation of this document (WAC) will ensure that radioactive waste management activities at LLNL are conducted in compliance with the requirements of DOE Order 435.1, *Radioactive Waste Management*, as described in the Radioactive Waste Management Basis for LLNL, and the Implementation Guide for DOE Manual 435.1-1, *Radioactive Waste Management Manual*.

1.5 Responsibilities

General Responsibilities are indicated in ES&H Manual Document 2.1 Appendix D

Generator Responsibilities:

- Prior to generating a new waste with a radioactive component, generators must complete the Life Cycle Planning with the RHWM representative.¹⁵
- Prior to generating any type of waste, the generator must evaluate the process or activity, identify the types of waste to be generated, and coordinate required actions with RHWM.
- Procure appropriate containers.
- Properly identify and manage the waste they generate to provide RHWM representatives with sufficient information to safely handle and manage it.¹
- Complete the required waste management training.¹

Radioactive and Hazardous Waste Management Division Responsibilities:

- Manage or assist in managing the Hazardous, Radioactive, Mixed and California Combined waste from generation to disposal in an environmentally safe manner protective of the worker, public health and the environment. ¹
- Perform waste characterization activities based upon the waste identification information provided by the generator of the waste. ⁴
- These RHWM criteria are required for waste coming into the yard:
 - Waste verification by the Fingerprint Verification Analysis Checklist
 - Logging waste information into RHWM database
 - Supplying the required labels, criticality, waste and barcodes
 - Ensuring the container meets fissile material limits

1.6 Generator Training^{1, 5}

Generators are required to have a minimum level of training to have their waste accepted by RHWM. EPD offers training courses throughout the year to prepare waste generators for handling workplace wastes safely and in compliance with environmental regulations.

These courses are required under Federal and State waste regulations, and it is up to a generator's line manager to ensure all required training is completed. RHWM cannot accept waste from a generator whose training is not current.

A new suite of waste management training courses was established in 2003 replacing the old hazardous, low-level, and TRU waste courses. The new training courses for hazardous and radioactive wastes are conducted monthly. Annual refresher training is required now for all regulated waste courses and is offered on-line at the Environmental Protection Training Program's web site. The new waste generation training course numbers and titles are:

EP0006-COR Regulated Waste Management Core Training
EP0006-HZ Hazardous Waste Management Module
EP0006-HZRW Hazardous Waste Management Module Refresher
EP0006-RD Radioactive Waste Management Module
EP0006-RDRW Radioactive Waste Management Module Refresher

For information about waste management training course content and scheduling, visit the Environmental Protection Training Program web site or refer to the LLNL Course Catalog.

2.0 Waste Acceptance Requirements

2.1 Definitions of Waste Types¹³

A waste is defined as:

A waste is any material that has been discarded. A material is considered to be discarded if it being: disposed of; accumulated, stored, or treated instead of being disposed; has served its intended use and cannot be used without being processed; or is an unusable manufacturing byproduct. Waste also includes material in an unlabeled container or is in a deteriorated or damaged container.

The following are the types of waste that are managed at LLNL by RHWM under this WAC:

Table 2.1 Waste Type Definitions¹³

Type of Waste	Definition
California Combined Waste	Waste that meets the definition of LLW and contains California regulated hazardous constituent above the regulatory limit.
Hazardous Waste	Hazardous waste is a waste material that meets the criteria established by the EPA or the State of California to be hazardous and poses a danger to the public, health, safety, or the environment.
Low-Level Waste (LLW)	Low-Level Waste is radioactive waste that is not high-level waste, spent nuclear fuel, transuranic waste, or byproduct material (as defined in Section 11e (2) of the Atomic Energy Act of 1954 as amended).
Mixed Waste Can be TRU or LLW	Mixed waste is radioactive waste (LLW or TRU) that contains both a radioactive constituent and a Resource Conservation and Recovery Act (RCRA) hazardous waste constituent. Waste can become mixed because of: (1) generation as mixed waste during an

Type of Waste	Definition
	experiment or procedure; (2) exposure of RCRA hazardous waste to unconfined sources of radioactivity to the point that the waste becomes radioactive; or (3) improper waste segregation.
Non Hazardous Industrial Waste	Non-hazardous industrial waste are wastes that contain hazardous constituents below threshold-regulated hazardous waste limits but have specific disposal requirements.
TRU Waste	Transuranic waste is radioactive waste containing >100 nanoCuries (3700 Bequerels) of alpha emitting transuranium radionuclides (nuclides with atomic number > 92) per gram of waste, with half-lives > 20 years.

NOTE:

When you no longer have use for a chemical, please consider offering it to RHWM's Chemical Exchange Warehouse (CHEW) instead of declaring it as waste. The CHEW Technician will evaluate and pick up your good chemicals, temporarily store them, list them on a lab-wide database, and deliver your chemicals to someone who will use them productively. Both unopened and opened containers are accepted at CHEW, provided materials are pure, in their original containers, the container is clean, and the chemical is safe for RHWM staff to handle. Final chemical acceptance determination is largely based on potential chemical re-use at LLNL. Radioactive material or chemicals that are contaminated with radioactive material are not accepted into CHEW.

2.2 Authorization Basis or RCRA Hazardous Waste Facility Permit Conditions and Requirements

This section summarizes the requirements for waste acceptance by RHWM. The requirements in this section are based on either the Documented Safety Analysis (DSA) or the LLNL Hazardous Waste Facility Permit and Operation Plan conditions.

2.2.1 Radiological Waste Requirements^{3,7}

Tables 2.2a-2.2e indicated the limits for waste acceptance by RHWM as dictated by the DSA. Acceptance of waste exceeding these limits must be addressed through the USQ process. In addition to the following limits, the amount of radioactivity packaged in any one container of low-level waste may not exceed the quantity specified for a Type A container in DOT shipping requirements, 49 CFR 173.431 through 49 CFR 173.435, without prior approval from a Radiological Characterization Analyst and/or the RHWM Disposal Operations office.

Table 2.2a Approved Waste Container Limits for Solids

<u>Radioactive Content</u>	<u>Amount</u>	
Plutonium Equivalent-Curie (PE-Ci) ^a	6 PE-Ci (Mixed)	8 PE-Ci (Non-mixed)
Tritium	1,000 Ci	

^a Your RHWM Field Technician can assist you with PE-Ci calculations; applicable to all radionuclides except tritium

Table 2.2b Approved Waste Container Limits for Liquids

<u>Radioactive Content</u>	<u>Amount (Ci)</u>
Low-level	See Footnote a
Tritium	1,000
PE-Ci	1

a The limits applied to non-TRU/non-tritium radiological wastes in any container type are the nuclide limits as presented in DOE-STD-1027-92, Attachment 1, Table A.1, "Thresholds for Radionuclides," Category 2 column. The table is available from your RHWM Field Technician.

Table 2.2c Criticality Safety Controls for Fissile Containers with Only One Reflector

<u>Fissile Mass Limit* (Pu Equivalent)</u>	<u>Moderator/Reflector Controls</u>
120 g in Fissile/55 gal container**	All hydrogenous materials with hydrogen density greater than that of paraffin or polyethylene, 0.133 g H/cc, are NOT allowed. All other hydrogenous materials are allowed with unlimited quantities (paraffin, polyethylene, Superla White Oil No. 9, TrimSol and water are allowed). Only ONE of the following: 100 kg Nat-U or Dep-U, <i>or</i> 300 g beryllium, <i>or</i> 8 kg carbon or graphite.
80 g in Fissile/30 gal container	
40 g in Fissile/5 gal container	

* For certain isotopes, the specified maximum fissile limits could exceed the radiological container limit of six PE-Ci. **Both** limits must be met. (For example: six PE-Ci of ²³⁹Pu is approximately 96 grams. Therefore, the total quantity per 55-gal. container of ²³⁹Pu cannot exceed 96 grams.)

** A container is a 55-gallon drum equivalent if the container has a capacity no less than 55 gallons (208 liters) and its smallest dimension is no less than 22.25 inches (56.5 cm). For instance, a Standard Waste Box is a 55-gallon drum equivalent.

Table 2.2d Criticality Safety Controls for Fissile Containers with Mixed Reflectors

<u>Fissile Mass Limit* (Pu Equivalent)</u>	<u>Moderator/Reflector Controls</u>
65 g in Fissile/55 gal container	All hydrogenous materials with hydrogen density greater than that of paraffin or polyethylene, 0.133 g H/cc, are NOT allowed. All other hydrogenous materials are allowed with unlimited quantities (paraffin, polyethylene, Superla White Oil No. 9, TrimSol and water are allowed). 100 kg of Nat-U, and 300 g of beryllium, and 110 kg of carbon or graphite.

* A container is a 55-gallon drum equivalent if the container has a capacity no less than 55 gallons (208 liters) and its smallest dimension is no less than 22.25 inches (56.5 cm). For instance, a SWB is a 55-gallon drum equivalent..

Table 2.2e Criticality Safety Controls for Nat-U Containers

<u>Nat-U Mass Limit* (Nat-U Equivalent)</u>	<u>Moderator/Reflector Controls</u>
650 kg in Fissile*/55 gal container **	All hydrogenous materials with hydrogen density greater than that of paraffin or polyethylene, 0.133 g H/cc, are NOT allowed. All other hydrogenous materials are allowed with unlimited quantities (paraffin, polyethylene, Superla White Oil No. 9, TrimSol and water are allowed).
210 kg in Fissile*/30 gal container **	

* Fissile material is not allowed except for 0.6 g and 1.0 g Pu equivalent for 30- and 55-gallon containers, respectively

** . A container is a 55-gallon drum equivalent if the container has a capacity no less than 55 gallons (208 liters) and its smallest dimension is no less than 22.25 inches (56.5 cm). For instance, a SWB is a 55-gallon drum equivalent.

There are possible waivers from the moderator and reflector requirements. Contact your RHWM Field Technician for assistance.

2.2.2 Hazardous Waste Requirements

2.2.2.1 Single Container Inventory Limits

Single Container Inventory Limits (SCIL) exist and are the maximum amounts of a chemical allowed in any one container. Contact your RHWM representative to verify that the amount of hazardous material you plan to containerize is below the SCIL.³ Waste above the SCIL is not accepted at any RHWM facility.

2.2.2.2 Prohibited Items

Table 2.2f lists prohibited items that will not be accepted into any RHWM facility.

Table 2.2f Prohibited Waste Items ¹

Prohibited Item	Description
Explosives	RHWM cannot accept explosives in its main site facilities.
Inadequate Labels and Requisition Forms	Containers must have a complete label and Waste Disposal Requisition (WDR). Guidance on completing a WDR can be found in the RHWM procedure, WIC 116, <i>Waste Disposal Requisition Completion</i> . See your RHWM Field Technician for assistance.
Improperly Packaged Waste	<ul style="list-style-type: none"> • RHWM cannot accept improperly packaged waste or waste in damaged containers. • Incompatible waste shall not be put in the same container. • Waste shall not be put into a container that may be incompatible with waste.

Prohibited Item	Description
Shock Sensitive Materials	Shock sensitive materials cannot be accepted. Peroxidizable materials must be tested for peroxide content and inhibited with a compatible agent, for example, hydroquinone, prior to waste acceptance. Other shock sensitive materials must be hydrated, as applicable. Contact your RHWM Field Technician for additional guidance on the handling of these materials.
Unauthorized Point of Generation	Waste must be generated at either the Main Site or at Site 300.
Unknown Material	Unknowns cannot be accepted by RHWM.
Unstable or Reacting Waste	Waste needs to be stable for it to be accepted by RHWM. Stable is defined as not degrading the container or liner, not emitting any gases or any other reaction that would deem it unsafe to handle.
Waste Exceeding SCIL	Waste above the SCIL will not be accepted at any RHWM facility.
Waste from Untrained Generators	Generators must have the completed required waste management training for the waste to be accepted.
Waste without Form Codes/Waste Codes	Waste must match a waste code or form code identified in the LLNL RCRA Part B Permit.

3.0 Waste Acceptance Guidance

3.1 General Guidance

These guidelines are meant to assist you in managing your waste so that it can easily be accepted by RHWM. Most waste will fall within these guidelines. If your waste falls outside of these guidelines or it deviates from the guidelines, then prior authorization is required. (See Sections 1.3, 3.3)

State hazardous waste regulations and federal RCRA requirements limit the time you may store your waste in the Satellite Accumulation Area (SAA) or WAA prior to sending the waste to a TSDF, such as RHWM.

The following tables are the general guidelines for identifying your waste, packaging your waste for safe storage and the documentation you will need to complete for the waste to be accepted by RHWM.

3.1.1 Waste Identification Guidelines⁴

The following table contains guidelines for identifying your waste for acceptance by RHWM.

Table 3.1.1 Guidelines for Identifying Waste

Criteria	Guideline
Process Knowledge	<p>Waste that is generated at LLNL can be identified by waste generators through their knowledge of the process that generated the waste.</p> <p>The generators are responsible for providing critical waste identification information to RHWM whether the waste identification occurs preferably during the project planning phase, or once the waste is generated. This information includes:</p> <ul style="list-style-type: none"> • Identification of the starting materials • Description of the waste - generating process • The expected waste material components <p>This information must be documented in accordance with the RHWM procedures.</p>
Sampling and Analysis	<p>Sampling and analysis is used in conjunction with process knowledge to identify waste composition. Contact your RHWM Field Technician for further guidance if sampling and analysis is required.</p>

3.1.2 Labeling and Packaging^{5, 16}

The following table contains guidelines for labeling and packaging your waste for acceptance by RHWM.

Table 3.1.2 Guidelines for Labeling and Packaging Waste

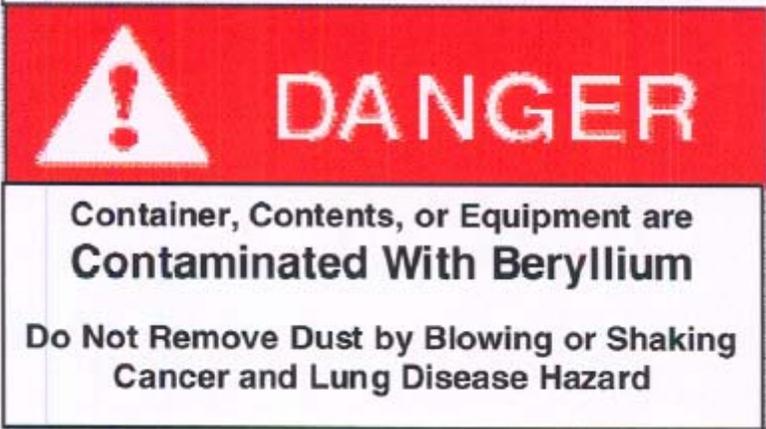
Criteria	Guideline
Biological Materials, Including Animals	<p>Should be packaged and label according to the ES&H Manual, Volume II, Document 13.1, <i>Biological Controls and Operation</i>.</p>

Criteria	Guideline
Asbestos Containing Materials	Should be packaged and labeled according to the ES&H Manual, Volume II, Document 14.9, <i>Safe Handling of Asbestos-Containing Material</i> .
Handling/ Transfer to the Consolidation Waste Accumulation Area (CWAA)	Before your waste can be moved to a RHWM CWAA, you must contact your RHWM technician to verify that all the required steps have been completed.
Labeling for Storage	<p>All waste containers must be labeled. Labels should be consistent with the waste identification/characterization information.</p> <p>All labels can be obtained from RHWM through your RHWM technician.</p> <p>Labels must be filled in and affixed to your container as soon as you begin adding waste to it, and updated as needed. Labels must be filled out legibly, accurately (for example, identify the presence of electronic waste), and clearly visible on the container using indelible ink. Incomplete labels or inaccurately labeled waste containers are out of compliance with regulations. Strike-throughs are not allowed on the label. If changes are necessary, remove the label from the container and start over with a new one. Do not place a new label over the old one. See ES&H Manual, Volume III, Document 36.3 <i>Management of Satellite and Waste Accumulations Areas</i> for guidance on how to complete waste labels.</p>
Materials and Equipment Containing Polychlorinated Biphenyls (PCBs)	Should be packaged and labeled according to the ES&H Manual, Volume II, Document 14.14, <i>Management of Polychlorinated Biphenyls</i> .

Criteria	Guideline
Packaging	<ol style="list-style-type: none"><li data-bbox="511 239 1224 277">1. Improperly packaged waste cannot be accepted.<li data-bbox="511 317 1284 354">2. Liquids and solids should not be packaged together.<li data-bbox="511 394 1406 474">3. Bulk solid waste, e.g., used drums and large equipment, may be accepted as is on a case-by-case basis.<li data-bbox="511 514 1398 594">4. Bulk liquids can be accepted in any compatible RHWM bulk liquid tank or tanker.<li data-bbox="511 634 1430 756">5. Intact aerosol cans must be packaged in a manner that does not allow activation of material release mechanisms. Corrugated partitioning may be used to meet this requirement.

<p>Packaging, continued</p>	<p>6. Small items, such as containers less than two gallons, must be individually labeled and overpacked into a larger container. Overpacks are to have sufficient absorbent to prevent the inner contents from breaking during handling and to absorb the entire content of liquid containers. Liquid scintillation cocktail vials are exempt from this requirement.</p> <p>7. All efforts should be made to package waste in the smallest acceptable container in which the waste will fit. The minimum, outer container size is 2 gallons.</p> <p>8. Pyrophoric material must be segregated from the LLW. Properly packaged pyrophoric materials are accepted into RWHM facilities for treatment. Pyrophoric uranium waste must be covered with water, trimsol, or a water/trimsol mixture and packaged in a vented 30-gallon container, then overpacked into a 55-gallon container.</p> <p>9. Water reactives must be packaged such that the packaging prevents the material from intrusion of water. Primary containers must be tightly sealed and overpacked in PATS-certified containers with appropriate absorbents such as X-sorb and/or U500 polypropylene. There may be specific Waste Disposal Facility mass limits for each container of reactive wastes.</p> <p>10. Generators should use only containers approved by LLNL's Packaging and Transportation Safety Committee (PATS), however there may be some instances that require use of non-PATS-certified containers. The following are examples of non-PATS -certified containers:</p> <ul style="list-style-type: none"> • Reshipment of DOT-approved product filled containers • Visquene-wrapped DOT regulated equipment • Non-DOT or PATS certified boxes <p>Contact your RWHM Field Technician for further guidance.</p> <p>11. PATS-approved containers shall be closed according to the manufacturer's closure instructions. Your RWHM Field Technician can provide additional guidance.</p> <p>Guidance for container selection is provided in Table 8 of the <i>Waste Analysis Plan</i>. Your area RWHM Field Technician can provide additional guidance.</p>
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Segregation	All waste should be segregated by waste type. (For example, LLW should be segregated from TRU waste, hazardous, mixed, biological, and nonhazardous wastes. In addition, solids, liquids, and gases (aerosols or gas cylinders) should be placed in separate containers).
Sharp Objects	Waste containing sharp objects should be identified in the description of the waste on the WDR or parcel card, and be enclosed in rigid packaging. Sharp objects labels shall be applied to the outer container.
Small Hand Tools (applicable to low-level mixed or combined waste only ²)	Low-level mixed or combined waste containing small hand tools should be identified in the description of the waste on the WDR or parcel card.
Void Space	Waste should be packed to minimize empty space.

<p>Waste Containing Beryllium</p>	<p>All containers of waste with beryllium, beryllium compounds, or beryllium-contaminated clothing, equipment, waste, scrap, or debris shall be labeled with the appropriate Waste Label (Nonhazardous, Hazardous, Radioactive, or Mixed Waste) and the additional label below.</p> <div data-bbox="573 415 1339 844" data-label="Image"></div> <p>In addition to the labeling requirement above, all waste containers from Regulated Beryllium Work Areas must be swiped and verified to meet the Free Release Criteria of less than 0.2 $\mu\text{g}/100\text{cm}^2$ beryllium surface contamination.</p> <p>Beryllium waste must be labeled and packaged in accordance with the ES& H Manual, Volume II, Document 14.4, <i>Implementation of the Chronic Beryllium Disease Prevention Program Requirements</i>.</p>
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3.1.3 Documentation

Table 3.1.3 Guidelines for Documentation Needed for Waste Acceptance by RHWM

Document	Guideline
Information Gathering Documents (IGD) ^{9*}	<p>An IGD is composed of information collected on a Process Knowledge Evaluation (PKE) or Process Information Worksheet (PIW), and can be used for all types of waste streams. The information collected, like waste characterization/identification and description, is needed to properly manage the waste.</p> <p>Ideally completed prior to the generation of a waste stream, these documents are completed once. Contact your RHWM Field Technician for assistance on which IGD should be used for your waste.</p>
Waste Disposal Requisition (WDR) ^{5, 7, A)}	<p>The WDR is a document for the generator to transmit information required by RHWM to properly manage waste.</p> <p>Before you remove your waste from your workplace, you must complete a WDR. Waste will not be accepted by RHWM without a WDR.</p> <p>Guidance on completing a WDR can be found in the RHWM procedure, WIC 116, <i>Waste Disposal Requisition Completion</i>.</p>

- A consolidation of the PKE and PIW information gathering processes into one document called the IGD is in the process of being developed.

3.1.4 Life-Cycle Planning^{6, 13}

For new waste that may have potential for a radiological component, DOE Order 435.1 requires the waste to be evaluated for disposal path options. Contact your RHWM Field Technician prior to generating a waste containing a radioactive component from a new process or a change in an existing process that may alter the waste generated. Waste with a radioactive component that has not been evaluated for life-cycle planning may require an exception from the acceptance guidelines.

It is the generator's responsibility to evaluate their process and/or activity and identify the types of waste that may be generated. See Table 2.1 for definitions of waste types.

Life-cycle planning will result in waste with the following waste dispositions:

- No Path to Disposal - Planned waste that cannot be made to meet the acceptance

criteria of any disposal facility. (Cost for characterization, transportation, treatment, and/or disposal are not factors in the evaluation of acceptability of the waste by the disposal facility.)

- No Disposal Option - Planned waste for which meeting the acceptance criteria of a disposal facility would be cost-prohibitive for characterization, treatment, transportation, disposal, and/or technology development.
- Waste with a Disposal Path and Option - Waste that has a path or option for disposal that is accessible to LLNL.

The DOE must approve the generation of any waste that is deemed to have No Path to Disposal.

3.1.5 Waste Certification¹³

Waste certification compares a waste item to a specific set of criteria and verifies that the item meets those criteria.

DOE Order 435.1 requires all waste with a radioactive component to be certified for storage, treatment, and disposal.

Some waste disposal sites also require waste to be certified prior to acceptance.

3.2 Specific Guidance

This section contains tables that give specific guidance for waste acceptance by RHWM by waste type. There may be other criteria that may pertain to your individual waste stream(s) that should be addressed prior to waste generation.

Deviations from the acceptance criteria require special approval or an exception to be granted in accordance with exceptions described in Section 1.3.

Most radioactive liquids are treated on-site. As long as labeling and packaging guidelines are properly followed this type of waste will be accepted into RHWM facilities. However, radioactive liquid waste with high organic content, for example, those mixtures containing solvent concentrations greater than 1%, have very limited disposal options, and therefore are only accepted into RHWM facilities on a case by case basis.

For any questions, assistance, or directions concerning these guidelines for acceptance of waste, contact your RHWM Field Technician.

3.2.1 Hazardous Waste Guideline Table

Hazardous waste is defined as waste that is determined by the EPA or by the State of California to be hazardous and pose a danger to public health, safety, or the environment. The following table summarizes the guidelines for hazardous waste acceptance.

Table 3.2.1 Specific Hazardous Waste Acceptance Guidelines^{1, 5}

Criteria	Guideline
Biological Material, including Animals	<p>Animals and animal parts should be frozen, and whole animals should be segregated from animal parts. Segregate hazardous from non-hazardous and radioactive from non-radioactive.</p> <p>This waste must be segregated and packaged in accordance with the current packaging instructions in order to be accepted.</p>
Controlled Substances	<p>Pure controlled substances should not be sent to RHWM facilities. Pure controlled substances are defined as chemicals (including their isomers, esters, ethers, salts, and salts of isomers, esters and ethers) that are listed on one of the five schedules that appear in the California Health and Safety Code, sections 11053-11058 and in 21 Code of Federal Regulations, Part 1308 and that are greater than 66% free of contamination. When unwanted controlled substances are encountered, the substance custodian must complete the DEA 41 form and notify Property Management, in writing, of his or her intent to ship the material to a DEA-approved reverse distributor (RHWM may facilitate). In addition to the DEA 41 form, the RHWM Controlled Substances Chain-of-Custody form (document number WGS0068) must be used to track custody of the material from the Substance Custodian to B411 Shipping Department personnel. RHWM will arrange for the transfer of the material to B411 Shipping Department. For further guidance, contact your RHWM Field Technician.</p>
Drug Precursors	<p>RHWM can accept drug precursors (as waste) into its storage facilities if routine waste management practices are followed, for example, a WDR is completed. Contact your RHWM Field Technician for further assistance.</p>

Criteria	Guideline
Fluorescent Tubes and Ballasts	This waste must be segregated and packaged separately. If the waste is generated from a Radioactive Materials Management Area (RMMA) certain contamination control procedures must be followed. Contact your area RHWM Field Technician for guidance.
Fuming Acids	Fuming acids, except hydrofluoric acid, shall be packaged in DOT-approved glass containers with sealable caps in order to be accepted. For further guidance, contact your RHWM Field Technician.
Gas Cylinders	Generators should try and return empty gas cylinders to the manufacturer through Industrial Gases. If return is not possible, complete the <i>Cylinder Inspection</i> form (SDFform 034) and give to your RHWM Field Technician. This form will be submitted with the WDR.
High-Efficiency Particulate Air (HEPA) Filters	Generators are responsible to provide RHWM with specific information about HEPA filters being removed from service in order for them to be accepted. When a filter is removed, the generator must obtain information about the type of process in which it was used. Complete a <i>Waste HEPA Filter Information</i> form (WGSform 0028).
Materials and equipment containing Polychlorinated biphenyls (PCBs)	Any waste suspected of containing PCBs must be segregated from other waste streams. Waste contaminated with PCBs greater than 50 ppm may require special handling or storage time restrictions. Refer to ES& H Manual, Volume II, Document 14.14, <i>Management of Polychlorinated Biphenyls</i> and/or contact your area RHWM Field Technician for assistance.
Medical Waste	Medical waste must be autoclaved or disinfected as described in the ES&H Manual, Volume III, Document 36.1, <i>Medical Waste Management Requirements</i> , prior to acceptance.
Nitric Acid	Depending upon concentration, nitric acid may require special packaging. ¹⁷ Contact your RHWM Field Technician for assistance.
Peroxide-forming Materials	If you have peroxide-forming materials, or suspect that you have waste materials that, when stored in a container, may form peroxide crystals, contact your RHWM Field Technician to arrange for testing. As a safety precaution, do not handle or move the waste container unnecessarily. See ES&H manual, Volume II, Document 14.1, for further guidance.

3.2.2 Low-Level Waste Guidance Tables

Low-level radioactive waste is defined as radioactive waste that is not high-level radioactive waste, spent nuclear fuel, transuranic waste, or by product material (as defined in Section 11e (2) of the Atomic Energy Act of 1954 as amended). The following tables summarize the guidelines for LLW acceptance.

The following table is based on acceptance criteria of the NTS WAC. It is LLNL's policy to certify all solid, low-level, radioactive waste for disposal at NTS.

Table 3.2.2 Specific Solid Low-Level Waste Acceptance Guidelines for Physical/Chemical Parameters^{5, 12}

Criteria	Guideline
Animals	Animals and animal parts must be kept frozen and whole animals should be segregated from animal parts; segregate hazardous from non-hazardous and radioactive from non-radioactive. This waste must be packaged in accordance with specific guidelines. Contact your RHWM Field Technician to arrange packaging assistance.
Asbestos Containing Material	Radioactive, friable asbestos waste at a concentration greater than 1% by weight must be packaged separately. Friable asbestos must be segregated from certified LLW. Contract your RHWM Field Technician for further assistance.
Chelating Agent	Must be less than 1% by weight of the waste to be accepted.
Classified	Classified waste must be declassified prior to acceptance at RHWM facilities. Classified solid LLW may be shipped directly from generator locations.
Etiological Agents	Waste containing pathogens, infectious waste, or other etiological agents as defined in Title 49 CFR 173.134 shall not be accepted.
Explosives	LLW shall not contain explosives that are deemed reactive as identified in 40 CFR 261 and CCR Title 22, Division 4.5, Chapter 11, Section 66261.
Gases	Compressed gases, aerosol cans and chemicals capable of generating

Criteria	Guideline
	gases or causing generation of liquids or vapors harmful to persons handling the containers are not allowed in certified low-level radioactive waste.
Hazardous Waste	Certified LLW cannot contain hazardous waste. It is the generator's responsibility to provide sufficient information to demonstrate the waste does not contain hazardous waste.
HEPA Filters	Generators are responsible to provide RHWM with specific information about HEPA filters being removed from service in order for them to be accepted. When a filter is removed, the generator must obtain information about the type of process in which it was used and complete a <i>Waste HEPA Filter Information</i> form (WGSform 0028) or PKE (for certified LLW).
Liquids	The LLNL policy is to preclude all free liquids from solid LLW.
Particulates	<p>Powders, ashes, and similar particulate waste materials shall be immobilized if more than one weight percent of the waste matrix consists of particles below 10 micrometers in diameter, or if more than 15 weight percent consists of particles below 200 micrometers in diameter. Waste that is known to be in a form that could mechanically or chemically be transformed to a particulate during handling and interim storage shall be immobilized.</p> <p>If particulates are smaller than 10 micrometers in diameter (for example, concrete dust), bag the waste in a total thickness of 6 mil plastic or greater, prior to placing waste into container.</p>
Polychlorinated Biphenyls (PCBs)	The concentration of PCBs in waste must be less than 5 ppm.
Pyrophorics	Certified LLW shall not contain pyrophoric material in a form that could spontaneously explode or combust if the container is breached. Pyrophoric material must be segregated from the LLW. Properly packaged pyrophoric materials are accepted into RHWM facilities for treatment.

Table 3.2.2a Specific Low-Level Waste Acceptance Guidelines for Radiological Properties^{5, 12}

Criteria	Guideline
Accountable Materials	Before transferring waste from a Materials Balance Area (MBA) to RHWM, certain requirements must be met. See your MBA representative or your RHWM technician for more information.
Contamination Control	The exterior container must be swiped to verify that it meets contamination control guidelines for release from radiologically controlled areas. For further guidance, see the ES&H Manual, Vol II, Document 20.2, <i>LLNL Radiological Safety Program for Radioactive Materials</i> .
Dose Rate	The combined beta, gamma, and neutron dose rate anywhere on the surface of an LLW waste container may not exceed 200 mrem/hr (the "contact-handled" limit).
Greater than Class C Waste	Greater-than-Class C (GTCC) waste may be accepted on a limited basis. GTCC is waste having concentrations of certain radionuclides above the Class C limits as stated in 10 CFR 61.55 (http://www.access.gpo.gov/nara/cfr). Note: Prior to generating this type of waste you should contact your RHWM Field Technician to verify that the waste has a disposal option/path prior to proceeding.
Liquids	Low-level liquid waste is accepted at RHWM facilities for on-site treatment. Liquids must be packaged in accordance with the guidance outlined in this document.
Pyrophorics	Pyrophoric uranium waste must be covered with water, trimsol, or a water/trimsol mixture and packaged in a vented 30-gallon container, then overpacked into a 55-gallon container. Other pyrophoric materials must be evaluated on a case-by-case basis.
Radiological Concentration Limits	As a LLW generator, you are responsible for identifying and quantifying all radionuclides present in your waste stream. Generators should consult with Section 2.2.1 to verify that the waste meets the radiological limits for acceptance by RHWM.
Tritium	RHWM must approve acceptance of tritium wastes with greater than

Criteria	Guideline
	1000 curies of tritium.

The implementation of this document (WAC) will ensure that waste management activities at LLNL are conducted in compliance with the requirements of DOE Order 435.1, *Radioactive Waste Management*, and the Implementation Guide for DOE Manual 435.1-1, *Radioactive Waste Management Manual*. Low-level liquid waste is accepted at RHWM facilities for on-site treatment. Liquids must be packaged in accordance with the guidance outlined in this document.

3.2.3 TRU Waste Guidance Tables

Table 3.2.3 Specific TRU Waste Acceptance Guidelines for Physical/Chemical Properties^{5, 10}

Criteria	Guideline
Characteristic Solid TRU Mixed Waste	TRU mixed waste must not exhibit the characteristics of reactivity, corrosivity, or ignitability. Contact your area RHWM Field Technician for guidance.
Classified Waste	Classified TRU waste cannot be accepted.
Gases	Compressed gas containers (pressurized containers) are not allowed in waste.
Contamination Control	The exterior container must be swiped to verify that it meets contamination control guidelines for release from radiologically controlled areas. For further guidance, see the ES&H Manual, Vol II, Document 20.2, <i>LLNL Radiological Safety Program for Radioactive Materials</i> .
Explosives	Waste that is to be certified TRU for disposal at WIPP shall not contain explosives that are deemed reactive as identified in 40 CFR 261 and CCR Title 22, Division 4.5, Chapter 11, Section 66261.
Gas Generation	Generators should reduce, to the maximum extent possible, the number of hydrogen gas confinement layers in the waste container. For further assistance, contact your RHWM Field Technician.
Heat Generation	Internal heat generation produced by radioactive decay must not cause damage to the integrity of the container. There are specific calculations needed for decay heat that must be done for waste that is to be certified TRU. Contact your area RHWM Field Technician for assistance.
Liquids and Liquid - Containing waste	TRU Liquid waste will be accepted on a very limited basis for treatment. Pre-approval is required. Contact your area RHWM Field Technician for assistance.
Polychlorinated Byphenols (PCBs)	Any waste suspected of containing PCBs must be segregated. Waste contaminated with PCBs greater than or equal to 50 ppm will be accepted on a limited basis. Contact your area RHWM

Criteria	Guideline
	Field Technician for further guidance.
Pyrophorics	TRU waste shall not contain pyrophorics.
Sealed Rigid Containers	Internal sealed rigid containers, in a payload container such as a 55-gallon drum, greater than four (4) liters will not be accepted as a component of waste.

Table 3.2.3a Specific TRU Waste Acceptance Guidelines for Radiological Properties

Criteria	Guideline
Accountable Materials	Before transferring waste from a Materials Balance Area (MBA) to RHWM, certain requirements must be met. See your MBA representative or your RHWM technician for more information.
Dose Rate	The combined beta, gamma, and neutron dose rate anywhere on the surface of a TRU waste container may not exceed 200 mrem/hr (the "contact-handled" limit).
Radiological Composition	The radiological composition needs to be calculated in accordance with the WIPP WAC and other RHWM procedures. Contact a WGS representative for assistance. Generators should consult with Section 2.2.1 to verify that the waste meets the radiological limits for acceptance by RHWM.

3.2.4 Mixed Waste and California Combined Waste Guidelines

Mixed Waste is defined as radioactive waste that also contains a RCRA hazardous constituent. Waste can become mixed because of: (1) generation as mixed waste during an experiment or procedure; (2) exposure of RCRA hazardous waste to unconfined sources of radioactivity to the point that the waste becomes radioactive; or (3) improper waste segregation.

California Combined waste is defined as waste that meets the definition of LLW and also contains only State of California regulated hazardous constituent above regulatory limits (for example, is free of RCRA hazardous waste constituents above regulatory limits). California Combined waste in most cases is categorized as LLW. The LLW, TRU, and/or hazardous guidelines tables also apply and should be consulted for these waste types.

Characterization, treatment, and disposal of mixed and combined waste is costly so this waste type should be minimized and have undergone Life-Cycle Planning (see Section 3.1.4).

The following table is based on the acceptance criteria of Envirocare, where most of LLNL's solid mixed and combined waste is shipped for disposal.

Table 3.2.4 Mixed Waste and California Combined Solid Waste Guidelines²

Criteria	Guideline
Animal Carcasses	Waste materials containing untreated biological, pathogenic, or infectious material including contaminated laboratory research animals are not accepted.
Gases	Compressed gases, aerosol cans and chemicals capable of generating gases or causing generation of liquids or vapors harmful to persons handling the containers are not allowed in mixed and combined low-level radioactive waste.
Greater than Class A Waste	Radioactive mixed and California combined low-level radioactive wastes that are classified as Class B or C waste or Greater Than Class C are not accepted.
Liquids and Liquid - containing waste	LLNL's policy is to preclude all free liquids from solid mixed and California combined low-level waste.
Mixed and Combined Liquid	Mixed and combined liquid is accepted at RHWM facilities.
Particulates	<p>Powders, ashes, and similar particulate waste materials shall be immobilized if more than one weight percent of the waste matrix consists of particles below 10 micrometers in diameter, or if more than 15 weight percent consists of particles below 200 micrometers in diameter. Waste that is known to be in a form that could mechanically or chemically be transformed to a particulate during handling and interim storage shall be immobilized.</p> <p>Waste containing particulates requires evaluation prior to acceptance to determine if immobilization is required. Contact your area RHWM Field Technician for assistance.</p>
Polychlorinated Biphenyls (PCBs)	Any waste suspected of containing PCBs must be segregated. Waste contaminated with PCBs greater than or equal to 50 ppm will be accepted on a limited basis. Contact your area RHWM Field Technician for further guidance.

Criteria	Guideline
Reactive Waste	Reactive mixed and California combined low-level waste is not accepted into RHWM facilities.
Pyrophorics	Pyrophoric materials contained in mixed and California combined low-level wastes must be prepared and packaged as to meet DOT requirements.
Sealed sources	Sealed sources or radioactive material are not allowed in mixed or California combined waste without prior approval. Contact your area RHWM Field Technician for assistance.

3.2.5 Non-Hazardous/Non-Radioactive Guideline Table

Non-hazardous waste is defined as waste that can contain RCRA or California regulated hazardous constituents that are below threshold regulated hazardous waste limits, but exceed those limits which are permissible for discharge to the sanitary sewer under the LWRP Permit or sanitary landfills.

The following table summarizes the specific guidelines for non-hazardous waste acceptance.

Table 3.2.5 Specific Non-Hazardous Waste Acceptance Guidelines⁵

Criteria	Guideline
Hazardous Waste - California Hazardous and Mixed Waste	Must be below the regulated thresholds.
Non-friable asbestos	Non-friable asbestos may be accepted if packaged to meet packaging requirements.
Retention Tank Water	Must be sampled and analyzed in accordance with wastewater guidance from the WGMG to ensure that it meets sewer release limits. Further documentation may be required. RHWM should be contacted prior to release to ensure that all analysis and required documentation have been completed.

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10. U.S. Department of Energy, Carlsbad Area Office. *Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, Revision 0.1, July 25, 2002.
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17. U.S. Environmental Protection Agency. "Protection of the Environment," *Title 40, Code of Federal Regulations*, Part 261 (40CFR), latest revision.