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# LANL Waste Acceptance Criteria

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# LANL Waste Acceptance Criteria

## 1.0 PURPOSE

This document describes recycling, waste storage, treatment, and disposal paths and the specific Waste Acceptance Criteria (WAC) for:

- Radioactive Liquid Waste Treatment Facility (RLWTF)
- Radioactive Liquid Waste Treatment Plant (RLWTP)
- Technical Area Nevada National Security Site (NNSS)4, Area G
- Technical Area NNSS4, Area L
- Consolidated <90-day storage areas
- Infectious waste direct off-site shipments
- Los Alamos National Laboratory (LANL or the Laboratory) Material Recycling Facility (MRF)
- Sanitary Wastewater System (SWWS) Plant
- Low-Level Radioactive Waste (LLW) to NNSS and other off-site disposal facilities
- Transuranic (TRU)/Mixed TRU to the Waste Isolation Pilot Plant (WIPP)
- Hazardous/Universal Wastes for treatment/disposal/reclamation
- Scrap metal recycling or disposal

LANL's waste management requirements are consistent with applicable United States (US) Department of Energy (DOE) orders and state and federal regulations. For information on LANL's waste management requirements, see P409, *Waste Management*. For information on LANL's radioactive waste certification, see P930-2, *Radioactive Waste Certification Program*.

The DOE, through DOE O 435.1, *Radioactive Waste Management*, and the Environmental Protection Agency (EPA), through Resource Conservation and Recovery Act (RCRA) regulations, both require waste to be characterized and certified. DOE O 435.1 requires radioactive waste management facilities to implement waste acceptance programs. RCRA requires Treatment, Storage, and/or Disposal Facilities (TSDFs) to know what is in the waste containers it accepts. The WAC specifies what waste types can be accepted and how they must be containerized and labeled. Waste generating processes should be preplanned to ensure that waste management funding is available, waste is minimized, and a waste disposal path exists.

## 2.0 AUTHORITY AND APPLICABILITY

### 2.1 Authority

This document is issued under the authority of the Laboratory Director to direct the management and operation of the Laboratory, as delegated to the Associate Director for Environment, Safety, and Health (ADESH) as provided in the Prime Contract. This document derives from the Laboratory Governing Policies, particularly the section on Environment.

- Issuing Authority (IA): Associate Director for Environment, Safety, and Health (ADESH)
- Responsible Manager (RM): Waste Management (WM) Division Leader
- Responsible Office (RO): Waste Management-Waste Management Programs (WM-PROG) Group

### 2.2 Applicability

This document applies to all persons managing, planning, generating, characterizing, handling, processing, transporting, or otherwise involved with waste at the Laboratory.

## 3.0 PROCEDURE DESCRIPTION

### 3.1 Waste Acceptance Program

LANL's WM Division provides the systems through the Waste Compliance and Tracking System (WCATS) for which generators of radioactive waste and nonradioactive waste submit requests for waste acceptance.

Waste Projects and Services (WPS) personnel assess incoming Waste Stream Profile (WSP) information using the following criteria, and checking for completeness and consistency. WPS personnel review and approve or reject the electronic submittal and may request additional information, if necessary.

1. Waste to be generated within the facilities is properly defined and categorized, prior to generation, using waste stream templates found in WCATS, which provides WPS with the generator's expectations of waste type, and content. Instructions for creating and managing waste streams and waste profiles are found in the WCATS User's Manual, Section 4, *Creating and Managing Waste Streams and WPFs*.

   The waste generator, with assistance from the generator's Waste Management Coordinator (WMC), creates the WSP in WCATS.

2. The WMC creates the on-line Waste Disposition Request (WDR) in WCATS and completes the appropriate forms for the type of waste as follows:

   - For LLW, Mixed Low-Level Waste (MLLW) and nonradioactive waste, the waste generator and/or WMC creates the waste item/container found in WCATS. For instructions on creating the waste identification, see the WCATS User's Manual, Section 5.2.1, *Waste Item Identification Using the Mobile Device*.
   - The WMC then creates a WDR and submits it electronically for review and approval. For instructions on creating the WDR, see the WCATS User's Manual, Section 7.2, *Submitting a Waste Disposition Request.* For help regarding waste data issues on WCATS, the waste generator or WMC may send an e-mail to wastehelp@lanl.gov or call the waste help call center at 665-2494. A ticket will be created for responding to the inquiry coming into the waste help lines.
   - Form 1971, *TRU Waste Storage Record*, must be used for TRU waste to be stored at Technical Area (TA)-54 before certification for shipment to WIPP. Instructions for completing Form 1971 are in TL-002, *Waste Generator Guidance for Completing the TRU Waste Storage Record (TWSR*).
   - Form 2177, *TRU Waste Storage Record Change Form*, must be used to document and authorize changes made to data initially recorded on Form 1971. The waste generator should specify the waste package serial number in the upper right-hand corner of Form 2177, include any data that has changed from the initial data supplied on the original Form 1971, and submit the completed and signed Form 2177 to Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW).

### 3.2 Waste Types and Waste Management Facilities

If you know which attachment you need, click on the attachment number below to take you to the specific WAC attachment. Read the waste type description in the opening paragraphs of the attachment to verify you have selected the correct attachment for your waste type. If the waste type description does not match your waste, use the link in the attachment to return to the attachment listing below. Whenever there is doubt in the identification of a waste type or an acceptance criteria requirement for a waste type, consult your WMC, Waste Generator Services or the TSDF.

***Note:*** More than one attachment may apply to your waste stream.

- Attachment 1 Radioactive Liquid Waste Treatment Facility (RLWTF)
- Attachment 2 Contact-Handled Transuranic (TRU) Waste
- Attachment 3 Solid Low-Level Waste (LLW)
- Attachment 4 Removed and Reserved
- Attachment 5 Tritium-Contaminated Waste
- Attachment 6 Hazardous and Universal Waste
- Attachment 7 Mixed Low-Level Waste (MLLW)
- Attachment 8 Other Low-Level Waste (LLW)
- Attachment 9 Asbestos Waste
- Attachment 10 Infectious/Medical/Biological Waste
- Attachment 11 Polychlorinated Biphenyl (PCB) Waste
- Attachment 12 Green is Clean Waste
- Attachment 13 New Mexico Special Waste
- Attachment 14 Non-Hazardous Waste
- Attachment 15 Dumpster Waste
- Attachment 16 Sanitary Wastewater System (SWWS)
- Attachment 17 Waste Acceptance at the Nevada National Security Site (NNSS)
- Attachment 18 TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP)
- Attachment 19 Non-Hazardous, Non-Radioactive Scrap Metal

Radioactive waste generators must ensure their waste is certified for storage and shipment by complying with P930-2, *Radioactive Waste Certification Program*.

## 4.0 RESPONSIBILITIES

### 4.1 Waste Management Coordinators (WMCs)

- Assist with and complete waste documents.
- Assist waste generators by providing technical guidance regarding WCATS, LANL waste characterization, management, and disposition requirements.

### 4.2 Workers at Waste-Generating Facilities

- Responsible for waste minimization, characterization, storage, and disposal of the waste generated.
- Ensure adequacy of waste characterization methods.
- Maintain waste characterization documentation.

### 4.3 Waste Disposition Project

- Review and approve waste documentation for waste acceptance into the appropriate TSDFs.

### 4.4 Treatment, Storage, and/or Disposal Facilities (TSDFs)

- Perform a final check for waste being received at the facility.

## 5.0 IMPLEMENTATION

This document is subject to the Unreviewed Safety Question/Unreviewed Safety Issue (USQ/USI) Process as described in Safety Basis Procedure (SBP)112-3, *Unreviewed Safety Question (USQ) Process* as applicable to Hazard Category 2 and 3 nuclear facilities at LANL, and SBP113-3, *Unreviewed Safety Issue Process* for accelerators. Because the changes to this document may impact the presumptions of a facility's safety analysis, the requirements in this document are effective March 10, 2014 and this document is issued as PROVISIONAL until March 10, 2014. This provides the Facility Operations Director (FOD) additional time to complete the USQ/USI review. If the USQ/USI review cannot be completed by March 10, 2014, the FODs or designee must seek and obtain an exception or variance from the IA as described in Section 7.0.

## 6.0 TRAINING

Waste generators who sign waste profiles must be current with required training (see P409, *Waste Management*). Waste training is required for authorization of waste profile submittal. Waste disposal and storage requests will be rejected unless the waste profile is approved ("active"). Waste profiles are active for one year at a time and can be renewed. A waste profile extension must be requested before the expiration date. Waste management and acceptance personnel must comply with the applicable facility training and should be integrated into the existing facility specific training curriculum.

## 7.0 EXCEPTION OR VARIANCE

To obtain an exception or variance to this document, follow these instructions:

- Managers may request an exception or variance from the IA through the RM.
- At the IA's request, the RM will provide a recommendation or supporting information.
- The IA or designee will provide the requestor with a written response and copy the RM.

The requesting organization must maintain the official copy of record of the approved correspondence granting the exception or variance.

### Exemptions and Exceptions

Waste generators may request exemptions from or exceptions to the WAC by using Form 1973, *Waste Acceptance Criteria Exception Form (WEF)*. Exemptions or exceptions are requested when a generator cannot comply with a specific WAC or certification requirement, or when a requirement is not applicable. Along with the WEF, a Nuclear Criticality Safety Evaluation (NCSE)

must be performed when the WAC requirements cannot be met for fissile material in a waste package (see Attachment 17, *Waste Acceptance at the Nevada National Security Site [NNSS]*, Section 17.2.1, *Nuclear Criticality Safety).* The purpose of the NCSE is to ensure waste from a generator site location that may not meet disposition requirements can be documented for support of the waste to ship and to be processed/stored at the disposal facility.

***Note:*** Fissile material in a waste package that does not meet the WAC requirements is still required to have an NCSE.

In completing Form 1973, the following items must be provided:

- the WAC or certification requirement that cannot be met or is not applicable;
- the procedures, requirements, or methodology that will be used in lieu of the WAC or certification requirement; and
- the justification or documentation that demonstrates the equivalency of the method or the rationale for the use of the alternative methodology.

All exemptions or exceptions must be identified as pertaining to a one-time waste stream or an ongoing waste stream. Exemptions for ongoing waste streams must be maintained as part of the generator's certification documentation. Form 1973 must be signed by the WMC. After the form is signed, it is submitted to the WPS-HMLW group for processing. The affected TSDF will evaluate the request and either approve or reject the request based on the results of the evaluation. Exemption requests are normally returned within 30 days. However, more time may be required to evaluate complex issues. If the exemption or exception is not approved, the TSDF will provide an explanation on Form 1973. The TSDF may also provide on the form any special instructions or conditions to be used in the management of the affected waste. The original forms will be maintained by the TSDF. A copy of the request and the disposition will be returned to the WMC. A copy of the approved request describing the affected waste must accompany the waste characterization or shipment.

## 8.0 DOCUMENTS AND RECORDS

### Office of Record

The Policy Office is the Laboratory Office of Record for this Institutional Document and maintains the administrative record.

WPS-HMLW is the office of records (includes waste profiles, WDRs, TWSRs, Form 1973, *Waste Acceptance Criteria Exception Forms [WEFs],* and FMU64-F224, *Green is Clean Material Disposal Request Forms*) generated in the execution of this document.

## 9.0 DEFINITIONS AND ACRONYMS

### 9.1 Definitions

See LANL *Definition of Terms*.

See the glossary associated with P409, *Waste Management*.

### 9.2 Acronyms

See LANL *Acronym Master List.*

See the acronym list associated with P409, *Waste Management.*

| | |
|---|---|
| ACM | Asbestos Containing Material |
| ADESH | Associate Director for Environment, Safety, and Health |
| ADNHHO | Associate Director for Nuclear and High-Hazard Operations |
| AK | Acceptable Knowledge |
| ALARA | As-Low-As-Reasonably Achievable |
| ASTM | American Society for Testing and Materials |
| BOD | Biochemical Oxygen Demand |
| BTU | British Thermal Unit |
| CFR | Code of Federal Regulations |
| CH-TRAMPAC | Contact-Handled Transuranic Waste Authorized Methods for Payload Control |
| CoC | Certificate of Compliance |
| COD | Chemical Oxygen Demand |
| DET | Determination of Equivalent Technology |
| DOE | Department of Energy |
| DOT | Department of Transportation |
| DP | Defense Program |
| DQO | Data Quality Objective |
| DTPA | diethylenetriaminepentaacetic acid |
| EDTA | ethylenediaminetetraacetic acid |
| EMO | Environmental Management Operations |
| ENV | Environmental Protection Division |
| ENV-EDA | Environmental Protection–Environmental Data and Analysis |
| ENV-RCRA | Environmental Protection-Water Quality and RCRA |
| ENV-RRO | Environmental Protection-Risk Reduction Office |
| EPA | Environmental Protection Agency |
| FGE | Fissile Gram Equivalent |
| FOD | Facility Operations Director |
| FY | Fiscal Year |
| GIC | Green-Is-Clean |
| GTCC | Greater-than-Class-C |
| HDPE | High-Density Polyethylene |
| HEPA | High Efficiency Particulate Air |
| HPR | Health Physics Release |
| HRI | Human Readable Interpretation |
| IA | Issuing Authority |
| IP | Industrial Package |
| LANL | Los Alamos National Laboratory |
| LANS | Los Alamos National Security, LLC |
| LCS | Laboratory Control Standard |
| LDR | Land Disposal Restriction |
| LLHB | Low-Level Hydrocarbon Burdened |
| LLW | Low-Level Waste |

| | |
|---|---|
| LLWD | Low-Level Waste Disposal |
| LRAD | Long-Range Alpha Detector |
| LSA | Low Specific Activity |
| LTP | LANL TRU Program |
| MAR | Material-at-Risk |
| MCE | Mercury Containing Equipment |
| MEK | methyl-ethyl-ketone |
| MLLW | Mixed Low-Level Waste |
| MRF | Material Recycling Facility |
| MSDS | Material Safety Data Sheet |
| MTRU | Mixed Transuranic Waste |
| NAC | Nevada Administrative Code |
| NCSE | Nuclear Criticality Safety Evaluation |
| NDEP | Nevada Division of Environmental Protection |
| NFO | Nevada Field Office |
| NFPA | National Fire Protection Association |
| NMAC | New Mexico Administrative Code |
| NMED | New Mexico Environment Department |
| NNSA | National Nuclear Security Administration |
| NNSS | Nevada National Security Site |
| NNSS WAC | Nevada National Security Site Waste Acceptance Criteria |
| NNSS-MWP | Nevada National Security Site-Mixed Waste Profile |
| NNSS-WP | Nevada National Security Site-Waste Profile |
| NPDES | National Pollutant Discharge Elimination System |
| NRC | Nuclear Regulatory Commission |
| OS-PT | Operations Support-Packaging and Transportation |
| PCB | Polychlorinated Biphenyl |
| PE-Ci | Plutonium Equivalent Curies |
| PE-g | Plutonium Equivalent Gram |
| PFITS | Performance Feedback and Improvement Tracking System |
| PK | Process Knowledge |
| PPE | Personal Protective Equipment |
| PSDR | Package Storage and Disposal Request |
| RALLW | Regulated Asbestos Low Level Waste |
| RCA | Radiological Control Area |
| RCRA | Resource Conservation and Recovery Act |
| RCT | Radiological Control Technician |
| RLW | Radioactive Liquid Waste |
| RLWCS | Radioactive Liquid Waste Collection System |
| RLWTF | Radioactive Liquid Waste Treatment Facility |
| RLWTP | Radioactive Liquid Waste Treatment Plant |
| RM | Responsible Manager |
| RO | Responsible Office |

| | |
|---|---|
| RP-1 | Radiation Protection-Health Physics Operations Group |
| RQ | Reportable Quantity |
| RTR | Real-Time Radiography |
| RWAP | Radioactive Waste Acceptance Program |
| RWMC | Radioactive Waste Management Complex |
| RWMS | Radioactive Waste Management System |
| SA | Special Analysis |
| SARP | Safety Analysis Report for Packaging |
| SBP | Safety Basis Procedure |
| SCO | Surface Contaminated Object |
| STP | Site Treatment Program |
| SVOC | Semivolatile Organic Compound |
| SWB | Standard Waste Box |
| SWMR | Solid Waste Management Regulation |
| SWWS | Sanitary Wastewater System |
| TA | Technical Area |
| TCA | trichloroethane |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TDS | Total Dissolved Solids |
| TFCHW | Treated, Formerly Characteristic Hazardous Waste |
| TID | Tamper-Indicating Device |
| TPH | Total Petroleum Hydrocarbons |
| TRU | Transuranic |
| TSCA | Toxic Substance Control Act |
| TSD | Treatment, Storage, and/or Disposal |
| TSDF | Treatment, Storage, and/or Disposal Facility |
| TSR | Technical Safety Requirement |
| TSS | Total Suspended Solids |
| TTO | Total Toxic Organic |
| TWSR | Transuranic Waste Storage Record |
| U&I | Utilities and Infrastructure |
| UCNI | Unclassified Controlled Nuclear Information |
| UDQE | Unreviewed Disposal Question Evaluation |
| UHC | Underlying Hazardous Constituent |
| UI | Utilities and Institutional Facilities |
| UN | United Nations |
| US | United States |
| USI | Unreviewed Safety Issue |
| USQ | Unreviewed Safety Question |
| USQD | Unreviewed Safety Question Determination |
| UST | Underground Storage Tank |
| VOC | Volatile Organic Compound |
| WAC | Waste Acceptance Criteria |

| | |
|---|---|
| WAP | Waste Analysis Plan |
| WCO | Waste Certification Official |
| WDP | Waste Disposition Project |
| WM-SVS | Waste Management-Services |
| WPS | Waste Projects and Services |
| WPS-HMLW | Waste Projects and Services-Hazardous Mixed Low Level Waste |
| WDR | Waste Disposition Request |
| WEF | Waste Acceptance Criteria Exception Form (Form 1973) |
| WETF | Weapons Engineering Tritium Facility |
| WM | Waste Management |
| WM-PROG | Waste Management-Waste Management Programs |
| WGI | Waste Generator Instruction |
| WII | Waste Item Inventory |
| WIPP | Waste Isolation Pilot Plant |
| WMC | Waste Management Coordinator |
| WMP | Waste Management Project |
| WNR | Weapons Neutron Research |
| WQCC | Water Quality Control Commission |
| WSP | Waste Stream Profile |

## 10.0 HISTORY

| **Revision History** | | |
|---|---|---|
| 06/05/08 | P930-1, Rev. 0 | Initial Issue. This document supersedes and cancels ISD 931-1, *LANL Waste Acceptance Criteria*. |
| 03/31/09 | P930-1, Rev. 1 | Changes in this revision include:<br>Attachment 3, limitation of 3.5 watts per cubic meter of waste (Section 3.1.6), changes to disposal pit and shaft limits (Table 3-1 and Section 3.2.3), and new waste container size limits (3.3);<br>Attachment 6, non-radioactive aerosol cans are now Universal Waste (Section 6.0);<br>Attachment 7, MLLW packages must be received by Waste and Environmental Services (WES) no later than five months before the one year storage period is exceeded (Section 7.8);<br>Attachment 17, for the Nevada National Security Site (NNSS) WAC, changes to radionuclides and their limits (Table 17-1), removal of emanation limits for radon and tritium-emanating radionuclides (limits tables were deleted), waste management requirements for Polychlorinated Biphenyls (PCBs) (Section 17.1.5), new waste package criticality safety limits (Section 17.2.1), waste package plutonium-equivalent gram limits (Section 17.2.2), packaging handling requirements (Section 17.2.5), and new waste container and shipping configuration requirements (Section 17.2.16);<br>Attachment 18, new Waste Exception Form requirements (Section 18.3). |

| **Revision History** | | |
|---|---|---|
| 07/13/09 | P930-1, Rev. 2 | Revisions to Table 17-1.<br>Removal of all references to Mixed Low-Level Waste (MLLW) and classified waste, both of which are prohibited for disposition at Nevada National Security Site (NNSS).<br>Low-Level Waste (LLW) containers with PCBs must be at least 90% full.<br>Roll-off boxes may not contain laboratory trash or Personal Protective Equipment (PPE).<br>Added to acceptable for roll-offs: PCB bulk product waste meeting 40 Code of Federal Regulations CFR 761.62(b)(1).<br>Section 17.2.7: Box weight exception added.<br>Fixed links, titles, and acronyms. |
| 09/30/10 | P930-1, Rev. 3 | Issued as a PROVISIONAL document until October 30, 2010. Changes in this revision include:<br>▪ Updated links, titles, organization names, and acronyms.<br>▪ Added that non-radioactive waste radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection*, Radiation Protection-Health Physics Operations Group (RP-1) procedures, and the off-site Treatment, Storage, and/or Disposal Facility (TSDF).<br>▪ **Attachment 1**. 'Reactor-produced' removed for tritium; Table 1-2: defined PCB; Table 1-4: removed Aluminum, Beryllium, boron, Cobalt, and Vanadium; Section 1.5: added generator or Waste Management Coordinator (WMC) present at pickup and ensuring necessary equipment availability; Section 1.5.2: Removed generator requirements for transport by flatbed truck.<br>▪ **Attachment 3**. Section 3.3: added use of 55 gallon drums or B-12 or B-25 boxes; Section 3.7.4: added requirements on characterization data or Acceptable Knowledge (AK) documentation. Waste Stream Profiles (WSPs) relying on AK as the characterization method will not be approved unless they are submitted with a complete AK package.<br>▪ **Attachment 4.** Compactable Solid Low-Level Waste, Removed and Reserved.<br>▪ **Attachment 6**. Section 6.3.1: added glass not to exceed 4 liters.<br>▪ **Attachment 7**: Section 7.2.3, Table 7-1: Limits for Fissile Material changed to 10 grams for 55 gallons or smaller packages; Section 7.10: added explanation of surcharge for contaminated gas cylinders.<br>▪ **Attachment 10**: Method of sterilization to be noted on the Waste Disposition Request (WDR); Section 10.1: Added that haulers of New Mexico special waste are to be registered with the New Mexico Environment Department (NMED); Section 10.1.1: Added that infectious waste must not be stored more than seven days without refrigeration other than the generator.<br>▪ **Attachment 11**. Added the following: Section 11.1.1: Liquid |

| **Revision History** | | |
|---|---|---|
| | | PCB >= 50 ppm cannot be solidified for disposal; Section 11.1.8: Disposal request must be submitted 6 months before exceeding one year in a PCB long-term storage area; Section 11.2.1: Liquid Radioactive PCB >= 50 ppm cannot be solidified for disposal.<br>▪ **Attachment 12**. Section 12.2: Removed High Density Waste; Added new Section 12.3: Timely disposal for failed Green-Is-Clean (GIC).<br>▪ **Attachment 13**. Sludge from the Sanitary Wastewater System (SWWS) Plant added as a special waste type; Section 13.3: Added that waste must be packaged in smallest container possible.<br>▪ **Attachment 15**. Added verbiage regarding dumpster waste for compactable sanitary solid waste trash only and metal wiring; Added requirement to contact Utilities if dumpster is full before regular schedule pickup; Added instructions for requesting a new dumpster.<br>▪ **Attachment 16**. Added the following: Generator must notify SWWS for changes in waste stream discharges; generator to provide charge account for sampling, investigation, preparation of work package, and/or pumping of the waste stream. Table 16-1: Added that if discharge is <100 gal/day, pH 5.0 is acceptable; Section 16.4: Added that Biochemical Oxygen Demand (BOD) test can take place if Microtox unavailable. Added definition for BOD5; Section 16.5: Added that septic, holding tanks and related equipment must be visible and protected from snow removal; Section 16.5: Removed inspection documented of facility conditions.<br>▪ **Attachment 17** Updated Table 17-7, *Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors (re-numbered Table 17-6 for Rev. 5)*.<br>▪ **Attachment 18**. Section 18.1: Figure 18-1: Removed example sign for each sink and drain; Table 18-2: Changed Tritium levels; Section 18.5: Added that generator is responsible for solid particles left over in liquid waste container; Section 18.5.2: Removed generator requirements for transport by flatbed truck.<br>▪ **Attachment 19**. Section 19.2.2: Added that generator provides RP-1 sample data or approval for recycle notice before requesting removal of recycle metal bin. |
| 10/30/10 | P930-1, Rev. 3 | Document became effective and is no longer PROVISIONAL. |
| 03/06/12 | P930-1, Rev. 4 | Updated Section 5.0 with current language regarding the Unreviewed Safety Question/Unreviewed Safety Issue (USQ/USI) screen.<br>Added language in Section 7.0, Attachment 2, and Attachment 3, indicating that a Nuclear Criticality Safety Evaluation (NCSE) must be performed when the Waste Acceptance Criteria (WAC) requirements cannot be met for fissile material in a waste package.<br>Updated links, titles, and acronyms. |

| Revision History | | |
|---|---|---|
| 09/23/13 | P930-1, Rev. 5 | Issued as a PROVISIONAL document until November 7, 2013.<br>Changed the Responsible Manager (RM) to the Waste Management (WM) Division Leader and changed the Responsible Office to Waste Management-Waste Management Programs (WM-PROG).<br>Changed all references to Waste Profile Form to Waste Stream Profile (WSP).<br>Revised document to reflect new processing of WSPs through the WCATS system.<br>Revised Attachment 17, *Waste Acceptance at the Nevada National Security Site (NNSS),* to update the requirements for disposal of LANL waste at NNSS.<br>Updated links, titles, and acronyms. |
| 11/07/13 | P930-1, Rev. 5 | Document became effective and is no longer PROVISIONAL. |
| 01/22/14 | P930-1, Rev. 6 | Issued as a PROVISIONAL document until March 10, 2014.<br>Clarified content in Attachments 3 and 5 regarding disposal of LLW and tritium-contaminated waste. |
| 03/10/14 | P930-1, Rev. 6 | Document became effective and is no longer PROVISIONAL. |

## 11.0 REFERENCES

Prime Contract:

- DOE O 435.1, *Radioactive Waste Management*
- DOE M 435.1-1, *Radioactive Waste Management Manual*
- DOE O 5400.5, *Radiation Protection of the Public and the Environment*
- NAP-70.4, *Information Security*

## 11.1 Other References

- P409, *Waste Management*
- P930-2, *Radioactive Waste Certification Program*
- Waste Compliance and Tracking System (WCATS)
- WCATS User's Manual
- TL-002*, Waste Generator Guidance for Completing the TRU Waste Storage Record (TWSR*)
- SBP 112-3, *Unreviewed Safety Question (USQ) Process*
- SBP113-3, *Unreviewed Safety Issue Process*
- EP-AP-2204, *WDP Unreviewed Disposal Question Evaluation (UDQE) and Special Analysis (SA) Process*
- glossary associated with P409, *Waste Management*
- acronym list associated with P409, *Waste Management*
- P121, *Radiation Protection*
- 49 Code of Federal Regulations (CFR), *Transportation*, Parts 106-180

- New Mexico Administrative Code (NMAC) 20, *Environmental Protection*, Chapter 4, Part 1, *Hazardous Waste Management*
- EM/RLW-FDR-01, *Pipeline Design Requirements for the LANL Radioactive Liquid Waste Collection System*
- 40 CFR 261.21, *Identification and Listing of Hazardous Waste, Characteristic of ignitability*
- 40 CFR 261.23, *Identification and Listing of Hazardous Waste, Characteristic of reactivity*
- 40 CFR 261.22, *Identification and Listing of Hazardous Waste, Characteristic of corrosivity*
- 40 CFR 261.24, *Identification and Listing of Hazardous Waste, Toxicity characteristic*
- 40 CFR 261.31, *Identification and Listing of Hazardous Waste, Hazardous wastes from non-specific sources*
- 40 CFR 261.32, *Identification and Listing of Hazardous Waste, Hazardous wastes from specific sources*
- 40 CFR 261.33, *Identification and Listing of Hazardous Waste, Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof*
- 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions*
- 40 CFR 766, *Dibenzo-Para-Dioxins/Dibenzofurans*
- 49 CFR 173.403, *Shippers-General Requirements for Shipments and Packagings, Definitions*
- 49 CFR 173.425, *Table of Activity Limits—Excepted Quantities and Articles*
- P330-6, *Nonconformance Reporting*
- P322-4, *Laboratory Performance Feedback and Improvement Process*
- 40 CFR 261, *Identification and Listing of Hazardous Waste*
- DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*
- 49 CFR 173.134, *Shippers—General Requirements for Shipments and Packagings—Definitions and exceptions*
- 40 CFR 761.3, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, Definitions*
- 40 CFR 82, *Protection of Stratospheric Ozone*, Subpart F
- 49 CFR, *Transportation*
- 10 CFR 61.55, *Waste Classification*
- 49 CFR 173.433(f), *Requirements for determining basic radionuclide values, and for the listing of radionuclides on shipping papers and labels*
- 49 CFR 173, Subpart B, *Preparation of Hazardous Materials for Transportation*
- ABD-WFM-002, Appendix B
- 49 CFR 173.453 *Shippers—General Requirements for Shipments and Packagings—Fissile materials – exceptions*
- 40 CFR 261.3, *Definition of Hazardous Waste*
- 40 CFR 273, *Standards for Universal Waste Management*
- NMAC 20.4.1.1001, *Modifications, Exceptions and Omissions*

- 49 CFR 173.50, *Shippers—General Requirements for Shipments and Packagings, Class 1—Definitions*
- 49 CFR 178, Subpart C, *Specifications for Cylinders*
- 49 CFR 173.12, *Exceptions for Shipment of Waste Materials*
- 49 CFR 173.24, *General Requirements For Packagings and Packages*, (h)
- 49 CFR 172.101, *Purpose and Use of Hazardous Materials Table*, Appendix A in Table 2
- Appendix B of 40 CFR 302.4, *Designation of Hazardous Substances*
- 40 CFR 268, *Land Disposal Restrictions*
- 40 CFR 268.2, *Land Disposal Restrictions, Definitions Applicable in this Part*
- 49 CFR 173.12(b), *Exceptions for Shipment of Waste Materials, Lab Packs*
- 40 CFR 763.83, *Definitions*
- 49 CFR 173, *Shippers—General Requirements for Shipments and Packagings*
- NMAC 20.9.8.12 F, *Asbestos Waste*
- CDC Office of Health and Safety
- NMAC 20.9.8.13.B, *Infectious Waste*
- 49 CFR 178.609, *Test Requirements for Packaging for Infectious Substances*
- 49 CFR 173.196, *Category A Infectious Substances*
- 49 CFR 173.201, *Non-Bulk Packagings for Liquid Hazardous Materials in Packing Group I*
- 49 CFR 173.212, *Non-Bulk Packagings for Solid Hazardous Materials in Packing Group II*
- 49 CFR 173.197, *Regulated Medical Waste*
- 49 CFR 172.432, *Infectious Substance Label*
- 49 CFR 172.323, *Infectious Substances*
- 40 CFR 761.75, *Chemical Waste Landfills*, (b)(8)(ii)
- 49 CFR 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements*
- 40 CFR 280, *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*
- 49 CFR 178, *Specifications for Packagings*
- P101-17, *Excavation/Fill/Soil Disturbance*
- Facilities Service Request
- Waste Management Signs website
- Nevada National Security Site Waste Acceptance Criteria (NNSS WAC)
- ENV-RCRA-Tool 313, *Waste Profile Extension*
- 40 CFR, *Protection of Environment*
- 40 CFR 268.40, *Applicability of Treatment Standards*
- Safe Drinking Water Act Standard Maximum Contaminant Level
- NAC 444.8632, *Compliance with federal regulations adopted by reference*

- 40 CFR 268.45, *Treatment Standards for Hazardous Debris*
- 40 CFR 268.49, *Alternative LDR Treatment Standards for Contaminated Soil*
- *Position Paper for High Moisture Content Waste*
- NAC 444.9452, *Adoption by reference of certain federal regulations*
- 40 CFR 761.61, *PCB Remediation Waste*
- 40 CFR 761.62, *Disposal of PCB Bulk Product Waste*
- 40 CFR 264.314(d), *Special Requirements for Bulk and Containerized Liquids*
- 40 CFR 265.314(e), *Special Requirements for Bulk and Containerized Liquids*
- *Position Paper on the Proper Characterization and Disposal of Sealed Radioactive Sources*
- DOE O 471.6, *Information Security*
- 40 CFR 266 Subpart M, *Military Munitions*
- 10 CFR, *Energy*
- 10 CFR 835, *Occupational Radiation Protection*, Appendix D, *Surface Contamination Values*
- *Position Paper on the Use of Lead Shielding for the Disposal of Low Level Waste at the NNSS*
- DOE-STD-1090, *Hoisting and Rigging* (current publication)
- 49 CFR 173.410, *General Design Requirements*
- 49 CFR 173.411, *Industrial Packagings*
- Waste Management Database Applications
- 40 CFR 761.62(b)(1), *Disposal of PCB Bulk Product Waste, Disposal in Solid Waste Landfills*
- P151-1, *LANL Packaging and Transportation Program Procedure*
- PD311, *Requirements System and Hierarchy*
- 1989/1995 Hazardous Waste Facility Permit
- P313, *Roles, Responsibilities, Authorities, and Accountability*

## 12.0 FORMS

Form 1971, *TRU Waste Storage Record*
Form 2177, *TRU Waste Storage Record Change Form*
Form 1973, *Waste Acceptance Criteria Exception Form (WEF)*
Form 1586, *Radioactive Materials Transfer*
FMU64-F224, *Green is Clean Material Disposal Request Form*
Waste Profile Charge Code Form, found in the Waste Management Database Applications

## 13.0 ATTACHMENTS

Attachment 1. *Radioactive Liquid Waste Treatment Facility (RLWTF)*
Attachment 2. *Contact-Handled Transuranic (TRU) Waste*
Attachment 3. *Solid Low-Level Waste (LLW)*
Attachment 4. *Removed and Reserved*
Attachment 5. *Tritium-Contaminated Waste*
Attachment 6. *Hazardous and Universal Waste*
Attachment 7. *Mixed Low-Level Waste (MLLW)*
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Attachment 9. *Asbestos Waste*
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Attachment 12. *Green is Clean Waste*
Attachment 13. *New Mexico Special Waste*
Attachment 14. *Non-Hazardous Waste*
Attachment 15. *Dumpster Waste*
Attachment 16. *Sanitary Wastewater System (SWWS)*
Attachment 17. *Waste Acceptance at the Nevada National Security Site (NNSS)*
Attachment 18. *TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP)*
Attachment 19. *Non-Hazardous, Non-Radioactive Scrap Metal*

## 14.0 CONTACT

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Website: http://int.lanl.gov/org/padops/adesh/waste-management/waste-generator-services/index.shtml

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 1. Radioactive Liquid Waste Treatment Facility (RLWTF) (Page 1 of 10)**

The Technical Area (TA)-50 Radioactive Liquid Waste Treatment Facility (RLWTF) receives and treats radioactive and industrial wastewaters with a radionuclide concentration of 500 nanocuries per liter or less (not including tritium) and with a tritium concentration of 20 nanocuries per liter or less. These wastewaters cannot contain Resource Conservation and Recovery Act (RCRA)-regulated toxic organic constituents, RCRA-regulated listed constituents, or (except for small volumes) RCRA-regulated characteristic constituents. Certain other contaminants are also prohibited, as set forth in this attachment.

The Waste Acceptance Criteria (WAC) in this attachment applies to industrial wastewaters being sent for treatment at the TA-50 RLWTF. This WAC does not apply to the "acid" and "caustic" process wastewaters generated at the Plutonium Complex (TA-55). A separate WAC pertaining to the "acid" and "caustic" process wastewaters can be obtained from the TA-55 Plutonium Complex Waste Management Coordinator (WMC).

The RLWTF receives and treats aqueous radioactive wastewater generated at LANL to meet the discharge criteria specified in a National Pollutant Discharge Elimination System (NPDES) permit. The majority of this wastewater is received at the RLWTF through a network of buried pipelines, known as the "Radioactive Liquid Waste Collection System" (RLWCS). Other wastewater is transported to the RLWTF by truck.

The WAC outlined in this attachment are applicable to all wastewaters (with the exception noted above) that are conveyed to the TA-50 RLWTF, whether by the RLWCS or by truck.

These WAC are based on the following:

- Department of Energy (DOE) O 435.1, *Radioactive Waste Management*, and its associated DOE M 435.1-1, *Radioactive Waste Management Manual.*
- DOE O 5400.5, *Radiation Protection of the Public and the Environment.*
- US Department of Transportation (DOT) regulations, 49 Code of Federal Regulations (CFR), *Transportation*, Parts 106-180.
- New Mexico hazardous waste management regulations (New Mexico Administrative Code (NMAC) 20, *Environmental Protection*, Chapter 4, Part 1, *Hazardous Waste Management*), which implement the federal RCRA.
- New Mexico Water Quality Control Commission regulations and standards, and NPDES permit NM0028355.

## 1.1 Facility Requirements for Connection to the Radioactive Liquid Waste Treatment Facility (RLWTF)

Buildings connected to the RLWTF by the RLWCS must meet the following criteria:

- The pipelines and associated telemetry must comply with the standards established in the EM/RLW-FDR-01, *Pipeline Design Requirements for the LANL Radioactive Liquid Waste Collection System*. A copy of this document can be obtained from the RLWTF Operations Manager at 667-4301.
- Pipelines within buildings that are part of the RLWCS must be labeled "Radioactive Waste Line." Labels can be obtained from the RLWTF at (505) 667-4301.

- Each sink connected to the RLWCS must be posted with a sign informing users of the requirements for disposing of wastewater down the drain. Signs may be obtained from the RLWTF at (505) 667-4301.

In addition, the drains listed in Table 1-1 must be plugged or have administrative controls to minimize the inadvertent introduction of large volumes of volatile organic liquids (e.g., gasoline) into the RLWCS.

**Table 1-1. Controls for the Radioactive Liquid Waste Treatment Facility (RLWTF) Drains**

| Building | Room | Description | Control |
|---|---|---|---|
| 03-29 | Wing 9 | Drain closest to rollup door | Plug the drain |
| 03-66 | B100N | Two floor drains | Administrative control* |
| 03-102 | 119 | Drain closest to rollup door | Administrative control* |
| 03-1264 | – – – | Only floor drain | Administrative control* |
| 35-213 | B-29 | Three floor drains | Plug the drain closest to the rollup door |
| 48-01 | 244 | Two floor drains | Administrative control* |
| 48-01 | 322 | Only floor drain | Plug the drain |
| 50-01 | 34B | Only floor drain | Administrative control* |
| 50-01 | Outside | Drain at the caustic unload station | Jersey barrier to preclude vehicle entry into bermed area |
| 50-37 | 116 | Drain closest to rollup door | Administrative control* |

* Administrative Control includes (1) gasoline vehicles not permitted entry; (2) gasoline vehicles braked and chocked outside before rollup door is opened; and (3) sign posted.

***Note:*** The RLWCS begins at the first connection point of the collection system with the facility piping that is outside the facility.

## 1.2 Waste Stream Profile (WSP)

Only wastewater having an approved WSP (in the Waste Compliance and Tracking System [WCATS]) may be discharged to the RLWTF.

Upon completion, the waste profile is to be sent to the Waste Management-Waste Management Programs (WM-PROG) group. A copy of the waste profile will be sent to the generator's WMC upon acceptance or rejection of the wastewater at the RLWTF. Contact your WMC for specific information related to the status of a waste profile. Any significant modification to the quality or quantity of the industrial waste water discharge requires submission of an amended waste profile.

### 1.3 Waste Acceptance Criteria Exception Form (WEF) (Form 1973)

Some waste streams that do not meet the WAC may be acceptable for treatment at the RLWTF. Also, a temporary change in the waste stream requires that the RLWTF be notified. The documentation for handling both of these situations is a WEF (Form 1973, *Waste Acceptance Criteria Exception Form*). RLWTF personnel will work with the generator to fill out a WEF. The WEF will need to be approved by RLWTF personnel before the new waste stream or the modified waste stream can be sent to the RLWTF. The WEF (Form 1973) may be obtained by clicking on the link or contacting your WMC. An approved (i.e., signed) WEF (Form 1973) must be electronically attached to the WSP before submittal of the WSP, in order for the WSP to be approved for use.

### 1.4 Wastewater Acceptance Criteria

To be acceptable for treatment at the RLWTF, wastewater must meet the criteria outlined in this section. Specifically, certain wastes are unacceptable for treatment at the RLWTF (see Table 1-2), and wastes must not have concentrations of radioactive or nonradioactive constituents in excess of amounts given in Tables 1-3 and 1-4.

If a waste stream includes any of the material listed in Table 1-2 or exceeds concentrations set forth in Tables 1-3 and 1-4, the generator must complete a WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) and submit the WEF (Form 1973) along with the waste profile. The RLWTF Process Engineer will then determine if the waste stream can be accepted for treatment. In addition, if adequate Acceptable Knowledge (AK) and/or analytical data is not available to clearly demonstrate the waste stream meets RLWTF acceptance criteria, the generator may provide the RLWTF Process Engineer with the available AK/data so the RLWTF Process Engineer may make an acceptance determination.

#### *1.4.1 Unacceptable Wastewaters*

Wastewaters with characteristics set forth in Table 1-2 are unacceptable for discharge to the RLWTF.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 1. Radioactive Liquid Waste Treatment Facility (RLWTF) (Cont.) (Page 4 of 10)**

| **Table 1-2. Wastes that are Unacceptable for Treatment at the Radioactive Liquid Waste Treatment Facility (RLWTF)** | |
|---|---|
| Nonradioactive Constituents | Resource Conservation and Recovery Act (RCRA)-regulated characteristic waste (D001 for ignitability, D003 for reactivity, as defined in 40 CFR 261.21, *Identification and Listing of Hazardous Waste, Characteristic of ignitability*, and 40 CFR 261.23, *Identification and Listing of Hazardous Waste, Characteristic of reactivity.*) |
| | RCRA-regulated characteristic waste (D002 for corrosivity, as defined in 40 CFR 261.22, *Identification and Listing of Hazardous Waste, Characteristic of corrosivity*) in volumes greater than 50 gallons per discharge. |
| | RCRA-regulated toxic metal waste (D004 – D011) (40 CFR 261.24, *Identification and Listing of Hazardous Waste, Toxicity characteristic*) |
| | RCRA-regulated toxic organic waste (D012 – D043) (40 CFR 261.24) |
| | RCRA-regulated listed waste (F-, K-, P-, U-listed) (40 CFR 261.31, *Identification and Listing of Hazardous Waste, Hazardous wastes from non-specific sources*, 40 CFR 261.32, *Identification and Listing of Hazardous Waste, Hazardous wastes from specific sources*, and 40 CFR 261.33, *Identification and Listing of Hazardous Waste, Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof*) |
| | DDT, dioxins, or pesticides at any detectable concentration determined by an approved Environmental Protection Agency (EPA) method |
| | Toxic Substance Control Act (TSCA) waste as defined in 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions,* and 40 CFR 766, *Dibenzo-Para-Dioxins/Dibenzofurans*, including but not limited to waste containing PCBs |

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 1. Radioactive Liquid Waste Treatment Facility (RLWTF) (Cont.) (Page 5 of 10)**

| **Table 1-2. Wastes that are Unacceptable for Treatment at the Radioactive Liquid Waste Treatment Facility (RLWTF) (Cont.)** | |
|---|---|
| Other | Sanitary waste (except for rad decontamination showers and sinks) |
| | Biological or microorganism waste |
| | Detergents and surfactants |
| | Boiler or chiller waters containing rust, scale, or other inhibitors |
| | Sludges or solids |
| | Dyes and scintillation cocktails |

**Table 1-3. Limits on Radionuclides Acceptable for Discharge to the Radioactive Liquid Waste Treatment Facility (RLWTF)**

| **Radionuclides** | **Maximum Allowable Concentration (Ci/L)** |
|---|---|
| **Total Radionuclide Content:** (sum of gross alpha, beta, gamma, or the sum of nuclides known to be in the waste) | 5.0E–07 |
| **Alpha Emitters** | |
| Am-241 Pu-240<br>Pu-238 U-234<br>Pu-239 | 1.0E–07 |
| U-235<br>U-238<br>Np-237 | 1.0E–08 |
| Th-232 | 1.0E–10 |
| **Beta Emitters** | |
| As-74 Rb-83<br>Be-7 Sc-46<br>Ce-141 Sc-48<br>Co-57 Se-75<br>Co-58 Sn-113<br>Eu-152 Sr-85<br>Mn-52 Sr-89<br>Mn-54 V-48<br>Y-88 | 1.0E–07 |
| I-133 Na-22 Rb-84 | 5.0E–08 |
| Zn-65 | 4.0E–08 |
| Co-60 | 2.0E–08 |
| Cs-134 Cs-137 Co-56 | 1.0E–08 |
| Sr-90 | 5.0E–09 |
| H-3 (accelerator-produced) | 0 (none allowed) |
| H-3 (reactor-produced) | 2.0E–08 |
| Ra-226 + Ra-228 | 5.0E–10 |
| Other Radionuclides | 1.0E–08 |

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 1. Radioactive Liquid Waste Treatment Facility (RLWTF) (Cont.) (Page 6 of 10)**

**Table 1-4. Limits on Nonradioactive Constituents Acceptable for Discharge to the Radioactive Liquid Waste Treatment Facility (RLWTF)**

| Constituent | Maximum Allowable Concentration (mg/L except where noted) |
|---|---|
| Ammonia-Nitrogen | 5 |
| Arsenic (D004) | <5 |
| Barium (D005) | <100 |
| Cadmium (D006) | <1 |
| Chromium (D007) | <5 |
| Chlorine (Free) | 1 |
| Copper | 1 |
| Cyanide | 5 |
| Fluoride | 10 |
| Lead (D008) | <5 |
| Mercury (D009) | <0.2 |
| Nitrate-Nitrogen | 70 |
| Perchlorate | 1 |
| Selenium (D010) | <1 |
| Silver (D011) | <5 |
| Zinc | 25 |
| Chemical Oxygen Demand (COD) | 250 |
| Total Suspended Solids (TSSs) | 10,000 |
| Total Toxic Organics (TTOs)* | 25 |

* See Table 1-5 containing TTO list.

### *1.4.2 Radionuclide Content*

The total radionuclide concentration [defined as the sum of gross alpha, gross beta (not including tritium), and gross gamma **or** the sum of individual alpha-, beta-, and gamma-emitting nuclides known to be in the waste] of a waste stream sent to the RLWTF must not exceed the value listed in Table 1-3. Limits on individual radionuclides are listed in Table 1-3.

The activity of the four predominant radionuclides must be listed on the waste profile. Radionuclides (in any concentration) that are known to be in the waste stream must also be listed on the waste profile.

### *1.4.3 Nonradioactive Constituents*

Liquid waste streams that contain nonradioactive constituents below the concentration limits in Table 1-4 and with a pH between 2 and 12.5 are acceptable for discharge to the RLWTF. A listing of the Total Toxic Organics (TTOs) is shown in Table 1-5.

Inorganic wastes with a pH from 0 to 2 and from 12.5 to 14 are also permitted for discharge to the RLWTF (Environmental Protection Agency [EPA] Hazardous Waste Number of D002) in the volume range of 0 to 50 gallons per discharge with an approved waste profile and adequate flush water used to minimize corrosion in the RLWCS.

### *1.4.4 Industrial Soaps and Nonsolvent Cleaners*

Janitorial wastewaters, such as mop water, are acceptable in the volume range of 0 to 25 gallons per discharge. Wastewater from lab glassware and laundry is acceptable in discharges of less than 100 gallons per discharge. The concentration of industrial cleaner must be less than 0.2% by weight. Wastewater with soaps or cleaners from machinery and/or equipment cleaning operations is acceptable in discharges of less than 100 gallons per discharge and containing industrial cleaners in concentrations of less than 0.2% by weight. Such waste streams must not have any detectable sheen or emulsions from oil, grease, rust inhibitor, or other petrochemicals.

### *1.4.5 Physical Characteristics*

Wastewater temperature must be less than or equal to 60°C (140°F). Temperatures above 60°C (140°F) will cause expansion and damage to the RLWCS. The generator must provide waste stream flow-rate data on the waste profile. Volume increases beyond the limits specified by the generator on the waste profile are not allowed.

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**Attachment 1. Radioactive Liquid Waste Treatment Facility (RLWTF) (Cont.) (Page 8 of 10)**

**Table 1-5. Total Toxic Organics (TTO)**

| Semivolatiles (Method 625A) | Semivolatiles (Method 625B) | Volatile Organics (Method 624) |
|---|---|---|
| Parachlorometa cresol | Acenaphthene | Acrolein |
| 2-Chlorophenol | Acenaphthylene | Acrylonitrile |
| 2,4-Dichlorophenol | Anthracene | Benzene |
| 2,4-Dimethylphenol | Benzidine | Dichlorobromomethane |
| 2,4-Dinitrophenol | Benzo (a) anthracene | Bromoform |
| 2-Methyl-4,6-dinitrophenol | Benzo (b) fluoranthene | Bromomethane |
| 2-Nitrophenol | Benzo (k) fluoranthene | Carbon tetrachloride |
| 4-Nitrophenol | Benzo (a) pyrene | Chlorobenzene |
| Pentachlorophenol | Benzo (g,h,i) Perylene | Chloroethane |
| Phenol | Benzyl butyl phthalate | 2-Chloroethyl vinyl ether |
| 2,4,6-Trichlorophenol | Bis (2-Chloroethyl) ether | Chloroform |
| | Bis (2-Chloroethoxy) Methane | Chloromethane |
| | Bis (2-Ethylhexyl) phthalate | Chlorodibromomethane |
| | Bis (2-Chloroisoprophyl) ether | 1,2-Dichlorobenzene |
| | 4-Bromophenyl phenyl ether | 1,3-Dichlorobenzene |
| | 2-Chloronaphthalene | 1,4-Dichlorobenzene |
| | 4-Chlorophenyl phenyl ether | 1,1-Dichloroethane |
| | Chrysene | 1,2-Dichloroethane |
| | Dibenzo (a,h) Anthracene | 1,1-Dichloroethylene |
| | Di-N-Butylphthalate | 1,2-Trans-chloroethylene |
| | 3,3'-Dichlorobenzidine | 1,2-Dichloropropane |
| | Diethyl phthalate | 1,3-Dichloropropene |
| | Dimethyl phthalate | Ethyl benzene |
| | 2,4-Dinitrotoluene | Methylene chloride |
| | 2,6-Dinitrotoluene | 1,1,2,2-Tetrachloroethane |
| | Di-n-octyl phthalate | Tetrachloroethylene |
| | 1,2-Diphenylhydrazine | 1,1,1-Trichloroethane |
| | Fluoranthene | Trichloroethylene |
| | Fluorene | 1,1,2-Trichloroethane |
| | Hexachlorobenzene | Toluene |
| | Hexachlorobutadiene | Vinyl chloride |
| | Hexachlorocyclopentadiene | |
| | Hexachloroethane | |
| | Indeno (1,2,3-cd) pyrene | |
| | Isophorone | |
| | Napthalene | |
| | Nitrobenzene | |
| | N-Nitrosodimethylamine | |
| | N-Nitrosodi-n-propylamine | |
| | N-Nitrosodiphenylamine | |
| | Phenanthrene | |
| | Pyrene | |
| | 1,2,4-Trichlorobenzene | |

## 1.5 Transported Wastewaters

Wastewater may be transported to the TA-50 RLWTF in containers (such as Tuff Tanks™ and 55-gallon drums) or tanker trucks, in compliance with applicable DOT regulations.

The generator is responsible for assuring that an approved and active waste profile and an on-line Waste Disposition Request (WDR), found in WCATS, are completed before transport and disposal. The WMC must be present at the time and place of pickup to ensure that the correct items are transported. The generator must also provide the necessary equipment, such as forklifts or pumps, required for safely loading the wastewater. The generator is also responsible for any valve line-up and openings at the generating facility.

The RLWTF does not treat solid waste or sludge. Any solid particles in excess of the value listed in Table 1-4 that have settled to the bottom of the liquid waste container will not be accepted for treatment at the RLWTF. The generator is responsible for the solid particles left over in the liquid waste container. The container and residual waste may be transported back to the generating facility after proper characterization is complete and the necessary transportation papers are approved. If the container and residual waste prove to be a Class 7 waste as defined in 49 CFR 173.403, *Shippers-General Requirements for Shipments and Packagings, Definitions*, then the generator or WMC should complete Form 1586, *Radioactive Materials Transfer*, and coordinate with Operations Support-Packaging and Transportation (OS-PT) for approval and transportation of material.

### *1.5.1 Tanker Truck Operations*

Waste transported in the RLWTF tanker truck must

- qualify as a DOT Exempt Classification or as a limited quantity of radioactive materials as defined by 49 CFR 173.425, Table *of Activity Limits-Excepted Quantities and Articles*, and must
- be located in an area accessible by a tanker truck.

The generator must:

- coordinate the date, time, and location with the RLWTF WMC (667-4301);
- ensure that the waste generator's WMC is present at the time and place of pickup; and
- provide any equipment required for safely transferring the waste (for example, forklifts, auxiliary pumps).

### *1.5.2 Flatbed Truck Operations*

Generators are responsible for their waste containers. After waste is disposed of at the RLWTF, RLWTF personnel triple-rinse the containers and survey them for surface contamination. The generator is responsible for retrieval and disposal of the empty containers. The container and residual waste may be transported back to the generating facility after proper characterization is complete and the necessary transportation papers are approved. If the container and residual waste prove to be a Class 7 waste as defined in 49 CFR 173.403, *Shippers-General Requirements for Shipments and Packagings, Definitions*, then the generator or WMC should complete Form 1586, *Radioactive Materials Transfer*, and coordinate with Operations Support-Packaging and Transportation (OS-PT) for approval and transportation of material.

Waste transported to the RLWTF in containers by flatbed truck must be transported in any of the following containers:

- Tuff Tanks™ or other DOT-approved portable containers. Tuff Tanks™ are not to be filled above the maximum fill line. If there is no maximum fill line, they must be filled to at least 60% and no more than 90% of capacity.
- DOT-approved, 55-gallon or 35-gallon metal, closed-head drums. Drums are to be filled to at least 60% and no more than 90% of capacity.
- Glass bottles or plastic carboys (not to exceed 5-gallon capacity) with fitted, screw-type caps.

Glass bottles or plastic carboys must not have any bottom outlets and must be overpacked in accordance with the appropriate DOT packaging authorization and packing group. If a liquid waste is not regulated by DOT, liquid waste transported in these containers must still be overpacked in a metal or plastic drum. The overpack must contain enough absorbent to absorb all of the liquid waste.

### 1.6 Inspection and Audit

RLWTF personnel will periodically audit generator documentation, such as waste profiles and WEFs (Form 1973, *Waste Acceptance Criteria Exception Forms*), against actual discharges to the RLWCS. RLTWF personnel will also periodically inspect generator facilities for compliance with Section 1.1, including inspection of drains identified as having the possibility for inadvertent introduction of large volumes of volatile organic liquids (e.g., gasoline) into the RLWCS. In addition, RLWTF personnel reserve the right to perform scheduled or non-scheduled monitoring of discharges from wastewater-generating facilities.

### 1.7 Nonconformances

The RLWTF Process Engineer will issue a nonconformance report in accordance with P330-6, *Nonconformance Reporting*, to any generating group that discharges or transports a waste stream to the RLWTF that does not meet the criteria outlined in this attachment and for which a WAC exception was not approved by the RLWTF. The issues and corrective action management process described in P322-4, *Laboratory Performance Feedback and Improvement Process*, must be used to document the root cause, corrective action and actions to preclude recurrence, and the results will be submitted by the generating group to the RLWTF. Environmental Protection-Water Quality and RCRA (ENV-RCRA) will also be notified of the nonconformance and corrective actions.

### 1.8 Notification

The Generating Group must notify the RLWTF in writing of any of the following:

1. Changes to generator's waste profile and WEF (Form 1973, *Waste Acceptance Criteria Exception Form*).
2. Significant modifications to the quality or quantity of the industrial waste water discharge.
3. Discharge into the RLWCS of any substance which, if otherwise disposed of, would be a hazardous waste under 40 CFR 261, *Identification and Listing of Hazardous Waste*.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 2. Contact-Handled Transuranic (TRU) Waste (Page 1 of 9)**

Contact-handled Transuranic (TRU) waste is waste containing alpha-emitting TRU radionuclides having atomic numbers greater than 92 and half-lives that exceed 20 years, at concentrations greater than 100 nCi/g of waste. The Waste Acceptance Criteria (WAC) for TRU waste are based on the following:

- The most recent WAC for the Waste Isolation Pilot Plant (WIPP),
- US Department of Transportation (DOT) regulations,
- Technical Area (TA)-54, Area G, Safety Analysis Report results and/or Technical Safety Requirements (TSRs),
- Resource Conservation and Recovery Act (RCRA) permit requirements,
- As-Low-As-Reasonably Achievable (ALARA) considerations, and
- Contact-Handled TRU Waste Authorized Methods for Payload Control (CH-TRAMPAC).

Contact-Handled TRU waste generators must be approved to package Contact-Handled TRU waste and must provide acceptable knowledge to the Contact-Handled LANL TRU Program (LTP) for review and approval as defined in the Waste Generator Instructions (WGIs) document (e.g., packaging configuration, acceptable knowledge) before waste generation. Approval to package Contact-Handled TRU waste includes

- Implementation of a WGI document, and
- Implementation of LTP-approved packaging and quality-assurance procedures

This document will be developed by the generators with assistance and approval by LPT. All Contact-Handled TRU waste generated for disposition will be reviewed and approved under a WGI document. The following sections describe the general WIPP WAC requirements. Any waste outside of these parameters must have a WGI document approved *before* generation and packaging of the waste for disposition and an approved WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) before the waste is shipped to TA-54. Along with the WEF, a Nuclear Criticality Safety Evaluation (NCSE) must be performed when the WAC requirements cannot be met for fissile material in a waste package (see Attachment 17, *Waste Acceptance at the Nevada National Security Site [NNSS]*, Section 17.2.1, *Nuclear Criticality Safety).* The purpose of the NCSE is to ensure waste from a generator site location that may not meet disposition requirements can be documented for support of the waste to ship and to be processed and stored at the disposal facility.

Newly generated TRU waste must be generated and packaged to meet the requirements shown in this section. Newly generated TRU waste is intended to be characterized and certified for disposal in WIPP with no additional repackaging being performed. Any TRU waste failing to meet the WIPP waste certification requirements, at the discretion of the Waste Disposition Project (WDP) manager, may be returned to the waste generator to have the unacceptable condition remediated. If the WDP remediates and repackages the waste, the costs of the remediation will be charged to the sending organization. TA-54 is not obligated to repackage newly generated TRU waste that does not meet the WIPP waste certification requirements.

Reporting Mixed Transuranic Waste (MTRU) is required to the Site Treatment Program (STP) for the State of New Mexico Environment Department's (NMED)'s, Hazardous Waste Bureau. The reporting applies to mixed waste stored for one year past the start accumulation date. The STP is intended to allow storage of accumulated mixed waste for more than one year (which is otherwise prohibited by the Land Disposal Requirements provision of RCRA) while identifying treatment and disposal options while working off inventory.

***Note:*** Also see Attachment 5, *Tritium Contaminated Waste,* for waste streams with high (i.e., more than 20 mCi/m3) tritium contamination.

## 2.1 Waste Form

TRU waste must be in solid form. Waste that complies with the following criteria meets this restriction.

### *2.1.1 Free Liquids*

Liquid waste is prohibited at WIPP. Residual liquids containing Polychlorinated Biphenyls (PCBs) are prohibited at WIPP. Waste must contain as little residual liquid as is reasonably achievable by pouring, pumping, and/or aspirating. Liquid must be no more than 1 % by volume of the outermost container; internal containers may not contain more than 60 milliliters or 3 % by volume. Hazardous waste number U134 must have no observable liquid. The total residual liquid in any payload container (e.g., 55-gal. drum or Standard Waste Box [SWB]) must be less than 1% by volume of that container.

Free liquids must be solidified in accordance with WIPP requirements as specified by the WGI document.

### *2.1.2 Explosives, Corrosives, and Compressed Gases*

Waste must contain no explosives, corrosives, or compressed gases (pressurized containers). Empty gas cylinders are acceptable if each cylinder is punctured or if the valve is held open with a wire through it. See Section 3.5.3 of the current version of Department of Energy/Waste Isolation Pilot Plant (DOE/WIPP)-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant* for requirements for identifying materials that meet the definition of explosives, corrosives, and compressed gases.

### *2.1.3 Restricted Constituents*

The following prohibitions and limitations apply to TRU waste:

- *Sealed containers.* All waste containers greater than 4 liters must be vented before being overpackaged in an outer waste container. This includes payload containers smaller than 55-gal. (e.g., 30-gal. and 15-gal. drums) that are overpacked in 55-gal. drums. Because of limitations associated with the Real-Time Radiography (RTR) characterization technique, any containers larger than three liters should be equipped with appropriate filters. RTR cannot distinguish whether a can has been taped, which makes it meet the definition of a sealed container. Any can is assumed to be sealed unless it is filtered or visibly vented as determined by RTR.

- *Pyrophoric material*. Pyrophoric radioactive materials must be present only in small residual amounts (less than 1% by weight) in payload containers and must be generally dispersed in the waste. Radioactive pyrophorics in concentrations greater than or equal to 1% by weight and all nonradioactive pyrophorics must be reacted (or oxidized) and/or otherwise rendered nonreactive before placement in the payload container. Nonradionuclide pyrophoric materials are not acceptable at WIPP.
- Classified wastes are prohibited from being stored at TA-54, Area G.

## 2.2 Package Contents

### *2.2.1 Transuranic (TRU) Radionuclides*

TRU radionuclides known to be in a waste package must be identified and reported by total curie content and equivalent gram quantity. The following radionuclides, if present in the waste, must be reported, regardless of quantity:

- Pu-238 U-233
- Pu-239 U-234
- Pu-240 U-238
- Pu-242 Sr-90
- Am-241 Cs-137

The reported activity for each TRU radionuclide must include the measurement error with 1-sigma confidence.

In addition, all radionuclides that contribute to 95% of the radioactive hazard for the payload container must be reported.

### *2.2.2 Plutonium-239 Equivalent Activity*

The TRU-radionuclide content of any single container of solidified or vitrified TRU waste must not exceed 1,800 Pu-239 Equivalent Curies (PE-Ci). The plutonium-239 equivalent limits for each type of container are shown in Table 2-1. These values are based on reported radionuclide results. There is no requirement to report uncertainty associated with the reported radionuclide results.

**Table 2-1. Plutonium-239 Equivalent Curie (PE-Ci) Limits**

| Payload Container | Package Configuration | PE-Ci Limit |
|---|---|---|
| 55-, 85-, and 100-gal. drum | Direct loaded—all approved waste forms other than solidified or vitrified waste | ≤80 PE-Ci |
| Standard Waste Box (SWB) | Direct loaded (or a bin)—all approved waste forms other than solidified or vitrified waste | ≤560 PE-Ci |
| Standard Waste Box | Overpacked assembly of undamaged 55- or 85-gal. drums that have intact drum lids, locking rings, and vent filters | ≤1,100 PE-Ci |
| Pipe Overpacks (standard, S100, S200, and S300) | All approved wastes forms | ≤1,800 PE-Ci |
| All Types | Solidified or vitrified waste | ≤1,800 PE-Ci |

Generators must use the PE-Ci values in Table 2-2 to determine the plutonium equivalent activity limits for TRU-waste packages.

**Table 2-2. Pu-239 Fissile Gram Equivalents (FGEs) and Pu-239 Curie Equivalents (PE-Ci) Limits***

| Isotope | Fissile Gram Equivalents | PE-Ci Equivalent |
|---|---|---|
| U-233 | 1.00 | 3.9 |
| Np-237 | 0.015 | 1.0 |
| U-235 | 1.00 | |
| Pu-236 | | 3.2 |
| Pu-238 | 0.113 | 1.1 |
| Pu-239 | 1.00 | 1.0 |
| Pu-240 | 0.0225 | 1.0 |
| Pu-241 | 2.25 | 51.0 |
| Pu-242 | 0.0075 | 1.1 |
| Am-241 | 0.0187 | 1.0 |
| Am-242m | 34.60 | |
| Am-243 | 0.0129 | 1.0 |
| Cm-242 | | 30.0 |
| Cm-243 | 5.00 | |
| Cm-244 | 0.09 | 1.9 |
| Cm-245 | 15.0 | |
| Cm-247 | 0.50 | |
| Cf-249 | 45.0 | |
| Cf-251 | 90.0 | |
| Cf-252 | | 3.9 |

Source: DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*

* Guidance for using Table 2-2:

1. Multiply the number of grams of a given radionuclide by the number in the "FGE" column to obtain Pu-239 Fissile Gram Equivalents (FGEs).
2. Divide the number of Curies of a given radionuclide by the number in the "PE-Ci 239 Equivalent" column to obtain Pu-239 equivalent Curies.

### *2.2.3 Fissile Radionuclides*

The fissile or fissionable isotope content (plus two standard deviations) of individual TRU-waste containers with less than 1% beryllium by weight must not exceed the following values in Pu-239 Fissile Gram Equivalent (FGE):

- 55-gallon drum—the total FGE must not exceed 200 g.
- 55-gallon drum configured as a pipe overpack—the total FGE must not exceed 200 g.
- SWB—the total FGE must not exceed 325 g.
- Generators must use the FGE values in Table 2-2 to determine the fissile limits for TRU-waste packages (Section 3.1.2 of the CH-TRAMPAC).

### *2.2.4 Hazardous Constituents/Characteristics*

Waste generators must provide TRU-waste characterization information based on the hazardous characteristics and constituents listed in 40 CFR 261, *Identification and Listing of Hazardous Waste,* Subparts C and D, and Appendix VIII. TRU mixed waste must be characterized according to the requirements established in the applicable waste analysis plan of the Laboratory mixed-waste Part B permit application. TRU wastes must not exhibit the hazardous characteristics of ignitability (D001), corrosivity (D002), and/or reactivity (D003) identified in 40 CFR 261, Subpart C. In addition, only the Environmental Protection Agency (EPA) hazardous waste codes listed in Table 2-3 are acceptable for disposal at WIPP.

**Table 2-3. WIPP/Area G Acceptable Resource Conservation and Recovery Act (RCRA) Hazardous Waste Codes**

| | | | |
|---|---|---|---|
| D004 | D032 | F009 | U079 |
| D005 | D033 | P015 | U103 |
| D006 | D034 | P030 | U105 |
| D007 | D035 | P098 | U108 |
| D008 | D036 | P099 | U122 |
| D009 | D037 | P106 | U133* |
| D010 | D038 | P120 | U134* |
| D011 | D039 | U002* | U151 |
| D018 | D040 | U003* | U154* |
| D019 | D043 | U019* | U159* |
| D021 | F001 | U037 | U196 |
| D022 | F002 | U043 | U209 |
| D026 | F003 | U044 | U210 |
| D027 | F004 | U052 | U220 |
| D028 | F005 | U070 | U226 |
| D029 | F006 | U072 | U228 |
| D030 | F007 | U078 | U239* |

* Acceptance of U-numbered waste listed for reactivity, ignitability, or corrosivity characteristics is contingent upon a demonstration that the wastes in their final waste form no longer exhibit the RCRA characteristic of reactivity, ignitability, or corrosivity.

### *2.2.5 Tritium-Contaminated Transuranic (TRU) Waste*

TRU waste that is contaminated with tritium must be packaged as specified by the Treatment, Storage, and/or Disposal Facility (TSDF). Material Disposal Area G TSDF requirements are specified in Attachment 5, *Tritium-Contaminated Waste*. A WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) must be submitted to and approved by the TSDF before packaging any tritium-contaminated TRU waste that contains tritium in concentrations of 10 Ci/m$^3$ or more. The TSDF will evaluate each tritium-contaminated waste stream and specify packaging requirements that limit the potential release of tritium. The packaging requirements are documented on the WGI.

An NCSE must be performed when the WAC requirements cannot be met for fissile material in a waste package (see Attachment 17, *Waste Acceptance at the Nevada National Security Site [NNSS]*, Section 17.2.1, *Nuclear Criticality Safety).* The purpose of the NCSE is to ensure waste from a generator site location that may not meet disposition requirements can be documented for support of the waste to ship and to be processed and stored at the disposal facility.

### *2.2.6 Decay Heat*

The decay heat (plus its total measurement uncertainty expressed in terms of one standard deviation) must be less than or equal to the limit of the assigned shipping category specified in the CH-TRAMPAC in Section 5.2.2. Waste packaged in this manner will not fail the WIPP WAC for decay heat. The WGI will specify the decay heat limit in terms of an activity limit for each container. If a TRU waste container fails the test category criteria in the TRAMPAC, that package must be repackaged to reduce the decay heat to acceptable levels.

## 2.3 Container Requirements

TRU-waste containers must be free from damage and securely closed for the waste to be accepted at Area G. Before using an approved container, the waste generator must inspect it for any damage that would prevent it from meeting DOT regulations and document this inspection. To ensure efficient use of storage capacity, waste containers must be as full as possible without compromising other requirements.

Containers used for packaging TRU waste must meet DOT specifications 7A, Type A, such as United Nations (UN) packagings UN1A1 or UN1A2. Currently approved containers include the following:

- White 55-gal. steel drums
- White 55-gal. steel drums (containing a pipe component)
- 85-gal. steel drums used for overpacks
- 71 in. × 54.25 in. × 37 in. steel SWBs

Other containers may be used for packaging TRU waste, but their use must be requested by the generator on a WGI and approved by the LANL TRU Program.

### *2.3.1 Drum Closure*

Drum heads (lids) must be closed and secured with the bolt of the bolt ring placed over the drum seam. This procedure must be used for all TRU-waste drums, including drums used for overpacks.

### *2.3.2 Venting*

TRU-waste containers must be vented using WIPP-approved filters. Venting must be accomplished according to the applicable WGI for each particular waste stream. In general, drums require at least one WIPP-approved filter, and SWBs requires at least two WIPP-approved filters. The number of filters required for approved nonstandard containers is determined by the LPT.

#### *2.3.3 Interior Packaging*

Interior packaging layers must have a filter. Interior metal containers must be vented to reduce gas accumulation. The tops of rigid drum liners must be punctured with a hole at least 0.8 cm (0.3 in.) in diameter or have a WIPP-approved filter installed.

Interior packaging must comply with the applicable WGI for the particular waste stream.

#### *2.3.4 Heavy or Sharp Items*

Heavy or sharp waste items must be securely blocked, braced, or packaged to prevent damage to the liner or container during handling and shipping.

### 2.4 Package Weight

The package weight must not exceed the rated capacity of the container based on DOT-specified package certification tests for the contained material or the following limits:

- 387 kg (853 lb) for 55-gal. drums
- 387 kg (853 lb) for 85-gal. overpacks
- 1,814 kg (4,000 lb) for SWBs
- 248 kg (547 lb) for pipe overpack (12-in. diameter)

### 2.5 External Package Contamination

Removable contamination on TRU-waste containers must not exceed 20 dpm/100 $cm^2$ alpha and 200 dpm/100 $cm^2$ beta-gamma. Painting over waste packages that exceed the contamination limits is prohibited.

The unshielded total surface dose rate of Contact-Handled TRU waste packages may not exceed 200 mrem/h. If the unshielded total surface dose rate exceeds 20 mrem/h, the generator must notify the LPT *before* arranging for the waste to be transported to Area G.

### 2.6 Package Marking and Labeling

#### *2.6.1 Marking and Labeling Requirements*

TRU-waste packages must be marked and labeled according to DOT regulations. In addition, each TRU-waste package must include the following:

- A Health Physics radioactive material tag completed and signed by a Radiological Control Technician (RCT);
- The gross weight of the container, in whole pounds, written in a minimum of one-half inch-high letters with waterproof ink;
- A yellow radioactive-waste marking;
- A blue nonregulated waste marking or a yellow hazardous-waste marking;
- A “Non-DP” marking on all containers of waste generated as a result of Non-Defense Program (DP)-funded activities; and

- A unique package number displayed on five white barcode labels, generated and supplied by the WDP.

If the waste requires the hazardous waste marking, this marking must contain the following:

- The generator's name and address,
- The manifest number, and
- The DOT proper shipping name and identification number.

The container must also be marked with the contents of the waste and the accumulation start date.

### *2.6.2 Marking and Labeling Placement on Drums*

Drums must have the following markings placed immediately adjacent to the drum seam between the top two rolling hoops:

- Radioactive waste marking,
- Non-regulated waste marking or hazardous waste marking, and
- One barcode label.

The following markings must be placed approximately 6 in. above the bottom of the drum:

- Three barcodes, with the first placed immediately adjacent to the drum seam and the other two barcode labels spaced evenly around the circumference of the drum.
- Non-DP marking placed immediately adjacent to the seam.
- The final barcode must be placed near the center of the drum lid.

An example of the placement of labels and markings on a drum is shown in Fig. 2-1.

**Fig. 2-1. Drum labeling.**

### *2.6.3 Marking and Labeling Placement on Standard Waste Boxes (SWBs)*

The following labels and markings must be placed near the center on each curved side either above or below the raised bars of the SWB:

- Radioactive waste marking
- One barcode label
- Non-DP marking

One barcode label must be placed near the center of the top of the SWB. A non-regulated waste marking or hazardous waste marking must be placed near the center of one of the curved sides. An example of a properly labeled and marked SWB is shown in Fig. 2-2.

**Fig. 2-2. Standard waste-box labeling.**

## 2.7 Additional Requirements

For mixed TRU waste stored in a less-than-90-day storage area, a completed Form 1971, *TRU Waste Storage Record*, must be submitted to the WDP for review on or before day 60.

Low-Level Waste (LLW) is waste that contains radioactivity and is not classified as high-level waste, Transuranic (TRU) waste, spent nuclear fuel, or tailings from the milling of uranium or thorium ore. LLW may include test specimens of fissionable material if it was irradiated for research and development purposes but not if it was used for producing power or plutonium, provided that the concentration of alpha-emitting TRU radionuclides with half lives greater than 20 years is less than 100 nCi of activity per gram of waste.

These Waste Acceptance Criteria (WAC) apply only to LLW destined for disposal at Technical Area (TA)-54, Area G. If waste is destined for Nevada National Security Site (NNSS), refer to Attachment 17, *Waste Acceptance at the Nevada National Security Site (NNSS)*.

## 3.1 Waste Form

LLW received at TA-54, Area G, must be in a solid form to minimize the potential for dispersion during handling or migration into and through the environment after burial. The requirements of this section restrict the physical, chemical, and biological contents of LLW in order to ensure that the long-term performance objectives of the Area G disposal site are met.

### *3.1.1 Residual Liquids*

Containers of solid LLW must contain as little residual liquid as is reasonably achievable. Internal containers (cans, bottles, etc.) must be well drained, but may contain residual liquids. The total residual liquids in the disposal container must not exceed 1% of the volume of the container when the volume of the disposal container is less than 100 gal. For LLW disposal containers greater than 100 gallons, the total volume of residual liquids must not exceed 0.1% of the volume of the disposal container. Liquids present in quantities greater than 1% by volume (or 0.1% for containers greater than 100 gal.) must be absorbed or stabilized. Residual liquid must not exceed 0.5% by volume (or 0.05% for disposal containers greater than 100 gal.) after the waste is processed into a stabilized form. Sorbents must be nonbiodegradable and identified in the Waste Stream Profile (WSP). Examples of nonbiodegradable sorbents include:

- Inorganic minerals, other inorganic materials and elemental carbon (e.g., aluminosilicates, clays, smectites, fuller's earth, bentonite, calcium bentonite, montmorillonite, calcined montmorillonite, kaolinite, micasillite, vermiculites, zeolites; calcium carbonate, oxides/hydroxides, alumina, lime, silica sand, diatomaceous earth; perlite, expanded volcanic rock; volcanic ash; cement kiln dust; fly ash; rice hull ash, activated charcoal/activated carbon).
- High molecular weight synthetic polymers (e.g., polyethylene, polypropylene, polyurethane). This does not include polymers derived from biological material or polymers specifically designed to be degradable.
- Sorbents determined to be nonbiodegradable under American Society for Testing and Materials (ASTM) Method G21-70, *Standard Practice for Determining Resistance of Synthetic Polymer Materials to Fungi*; or ASTM Method G22-76, *Standard Practice for Determining Resistance of Plastics to Bacteria*.

### *3.1.2 Powders and Particulates*

LLW containing powders, ashes, and other particulates of respirable size must be packaged in such a manner that the particulate portion of the waste will not be a hazard if the container is breached during handling operations. High Efficiency Particulate Air (HEPA) filters are exempted from these criteria.

### *3.1.3 Gases*

Waste gases must be packaged at a pressure that does not exceed 1.5 atm absolute at 20°C. Compressed gases as defined by 49 CFR, *Transportation,* must not be accepted. Empty pressurized containers and gas cylinders can be disposed of if the container or cylinder is punctured or if the valve is open and has a wire inserted through it.

### *3.1.4 Irradiation Sources*

Irradiation sources of 1 μCi or less may be disposed of without additional packaging. Additional information on irradiation sources is in Section 3.3.2 of this attachment.

### *3.1.5 Uranium Chips and Turnings*

Uranium chips and turnings packaged in mineral oil may be acceptable for treatment. The Low Level Waste Operations Manager must approve the waste stream before waste generation to determine a path forward for the waste. At a minimum, the packaging requirements for uranium chips and turnings include the following:

- No compaction of chips or turnings by mechanical or other means;
- Mineral oil is to be used as the protective fluid; ethanol and other flammable liquids are not to be used; and
- Liquids in the waste other than mineral oil used as a protectorant, such as oil or water, should be minimized to the extent practical.

Additional container packaging requirements for chips and turnings are specified in Section 3.3.6. of this attachment. Uranium chips and turnings will be accepted on a case-by-case basis at TA-54, Area G.

### *3.1.6 Thermal Power Limits*

The amount of radioactive material in a waste package must be limited so that the heat generated by radiolysis will not exceed 3.5 watts per cubic meter of waste. Wastes exceeding this wattage need to be evaluated to ensure that this heat does not affect the waste container or surrounding waste containers.

### *3.1.7 Complexing and Chelating Agents*

Complexing and chelating agents (e.g., ethylenediaminetetraacetic acid [EDTA], diethylenetriaminepentaacetic acid [DTPA], citric acid, acetic acid) must not be present at concentrations greater than 1% total (sum of all weight percents of complexing and chelating agents) by weight of the waste form.

### *3.1.8 Beryllium and Carbon*

The LLW matrix must not contain beryllium and/or carbon in amounts greater than 20% by weight of the total waste weight in a package (criticality requirement).

#### *3.1.9 Restrictions*

The following waste types or materials must not be packaged with solid LLW destined for disposal at Area G:

- Explosives
- Hazardous waste
- Pathogens, infectious wastes, or other etiologic agents as defined in 49 CFR 173.134, *Shippers—General Requirements for Shipments and Packagings—Definitions and exceptions*.
- Pyrophorics
- Greater-than-Class-C (GTCC) waste
- TRU waste
- Polychlorinated Biphenyl (PCB) waste as defined in 40 CFR 761,3, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, Definitions*.

In addition, LLW must not contain or be capable of generating by radiolysis or biodegradation, quantities of toxic gases, vapors, or fumes harmful to the public or workers or disposal facility personnel, or harmful to the long-term performance of the disposal site.

#### *3.1.10 Appliances Containing Refrigerants*

Refrigerants must be evacuated from appliances before disposal at Area G. The generator must provide a signed statement that all refrigerants that had not leaked previously have been recovered from the appliance by an Environmental Protection Agency (EPA)-certified technician in accordance with EPA requirements (40 CFR 82, *Protection of Stratospheric Ozone*, Subpart F). The statement must include

- The name and address of the person who recovered the refrigerant, and
- The date the refrigerant was recovered.

This statement must be submitted with the on-line Waste Disposition Request (WDR), found in WCATS.

#### *3.1.11 Classified Waste*

Classified waste is waste made up of classified items that have been determined by a generator to be no longer needed. Classified waste includes documents, film, parts or assemblies, safe- or vault-locking devices, computer tape, degaussed magnetic tape, metal parts, security and controlled administrative keys, and certain shapes of any material. All attempts must be made to declassify radioactively contaminated classified waste before disposal at Area G. If it is not possible to declassify the waste, the criteria described in Sections 3.3.4 and 3.7.5 of this attachment must be met.

### 3.2 Package Content

General restrictions on radionuclide content relate to the following:

- The exclusion of TRU waste,

- The exclusion GTCC waste,
- Criticality safety,
- Radionuclide limits defined by Tables 3-1 through 3-3, and
- As-Low-As-Reasonably Achievable (ALARA) considerations for personnel exposure.

Table 3-4 provides a description of radiological assay detection methods that are appropriate and recommended for identifying and quantifying radionuclides in LLW.

### *3.2.1 Transuranic (TRU) Radionuclides*

For waste to be classified as LLW, the concentration of alpha-emitting TRU radionuclides with half-lives greater than 20 years must not exceed 100 nCi/g of waste. TRU-contaminated waste cannot be disposed of at TA-54, Area G, when the activity concentrations exceed 100 nCi/g. The WAC for TRU waste may be found in Attachment 2, *Contact-Handled Transuranic (TRU) Waste*, of this document.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 3. Solid Low-Level Waste (LLW) (Cont.) (Page 5 of 15)**

**Table 3-1. Reportable Radionuclides and Upper Limits**

| Radionuclide | Disposal Pit Limit ($Ci/m^3$) | Disposal Shaft Limit ($Ci/m^3$) |
|---|---|---|
| Ac-227 | 1.8E+00 | 2.1E+01 |
| Ag-108m | 6.8E–02 | 8.7E–01 |
| Al-26 | 3.1E–02 | 4.2E–01 |
| Am-241 | 1.2E–01 | 1.4E–01[a,b] |
| Am-243 | 7.9E–02 | 1.4E–01[a,b] |
| Ba-133 | 4.2E+03 | 4.2E+04 |
| Be-10 | 4.8E+01 | 6.4E+02 |
| Bi-207 | 1.4E+00 | 1.6E+01 |
| Bk-247 | 7.2E–02 | 1.4E–01[a,b] |
| C-14 | 1.3E+00 | 8.0E+00[a] |
| Ca-41 | 2.2E+00 | 6.9E+01 |
| Cf-249 | 7.6E–02 | 1.4E–01[a,b] |
| Cf-251 | 7.2E–02 | 1.4E–01[a,b] |
| Cf-252 | 3.2E+03 | 4.0E+04 |
| Cl-36 | 1.2E–03 | 1.2E–01 |
| Cm-243 | 1.4E–01a,b | 1.4E–01[a,b] |
| Cm-244 | 1.4E–01a,b | 1.4E–01[a,b] |
| Cm-245 | 8.4E–02 | 1.4E–01[a,b] |
| Co-60 | 6.1E+06 | 4.8E+07 |
| Cs-135 | 4.4E+00 | 6.8E+01 |
| Cs-137 | 3.9E+00 | 4.4E+01 |
| Eu-152 | 1.6E+02 | 1.6E+03 |
| Eu-154 | 9.8E+03 | 9.1E+04 |
| Gd-148 | 1.8E+00 | 2.2E+01 |
| H-3 | 4.9E+02 | 4.5E+04 |
| Ho-166m | 5.7E–02 | 7.3E–01 |
| I-129 | 8.0E–02a | 8.0E–02[a] |
| K-40 | 6.3E–02 | 2.0E+00 |
| Kr-85 | 2.2E+15 | 4.6E+06 |
| Lu-176 | 1.9E–01 | 2.5E+00 |
| Mo-93 | 3.7E+00 | 6.2E+01 |
| Nb-93m | 1.3E+05 | 1.4E+06 |
| Nb-94 | 4.9E–02 | 2.0E–01[a] |
| Ni-59 | 1.0E+02 | 2.2E+02[a] |
| Ni-63 | 2.0E+02 | 7.0E+02[a] |
| Np-237 | 3.6E–02 | 1.4E–01[a,b] |
| Os-194 | 1.3E+07 | 1.0E+08 |
| Pa-231 | 9.9E–03 | 1.3E–01 |
| Pb-210 | 3.2E+00 | 3.6E+01 |
| Pm-145 | 5.1E+03 | 5.5E+04 |
| Pu-236 | 1.7E+00 | 1.8E+00 |
| Pu-238 | 1.4E–01[a,b] | 1.4E–01[a,b] |
| Pu-239 | 9.5E–02 | 1.4E–01[a,b] |
| Pu-240 | 9.6E–02 | 1.4E–01[a,b] |
| Pu-241 | 3.4E+00 | 4.9E+00[a,b] |
| Pu-242 | 9.9E–02 | 1.4E–01[a,b] |
| Pu-244 | 6.7E–02 | 1.4E–01[a,b] |
| Ra-226 | 1.6E–02 | 9.2E–02 |

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 3. Solid Low-Level Waste (LLW) (Cont.) (Page 6 of 15)**

**Table 3-1. Reportable Radionuclides and Upper Limits (Cont.)**

| Radionuclide | Disposal Pit Limit ($Ci/m^3$) | Disposal Shaft Limit ($Ci/m^3$) |
|---|---|---|
| Ra-228 | 7.7E+05 | 6.1E+06 |
| Si-32 | 8.6E+00 | 1.1E+02 |
| Sm-146 | 5.7E–01 | 7.9E+00 |
| Sm-151 | 1.2E+03 | 1.4E+04 |
| Sn-121m | 5.0E+02 | 6.1E+03 |
| Sn-126 | 8.1E–01 | 1.9E+01 |
| Sr-90 | 2.2E+00 | 2.6E+01 |
| Tb-157 | 6.3E+02 | 7.6E+03 |
| Tc-97 | 7.6E–01 | 5.2E+01 |
| Tc-99 | 9.1E–02 | 6.2E+00 |
| Th-228 | 5.4E+20 | 1.3E+21 |
| Th-229 | 5.5E–02 | 6.8E–01 |
| Th-230 | 3.5E–02 | 2.3E–01 |
| Th-232 | 2.0E–02 | 2.5E–01 |
| Ti-44 | 2.4E–01 | 2.8E+00 |
| U-232 | 1.6E–01 | 1.9E+00 |
| U-233 | 2.7E–01 | 3.7E+00 |
| U-234 | 5.3E–01 | 7.6E+00 |
| U-235 | 1.8E–01 | 2.5E+00 |
| U-236 | 6.2E–01 | 8.9E+00 |
| U-238 | 5.3E–01 | 7.5E+00 |
| Zr-93 | 8.6E+01 | 1.1E+03 |

[a] Indicates that the disposal limit is based on the Class-C waste concentration limits listed in Table 3-3; the radionuclide concentration limit estimated for the radionuclide on the basis of the intruder analysis is higher.
[b] The listed concentration limit given in Table 3-3 was converted to an activity per volume basis using a waste density of 1,400 kg/m3.

**Table 3-2. LANL Waste Acceptance Criteria for Solid Low-Level Waste (LLW) Disposal in Pit 37, 38, and 39 Headspace**

| Radionuclide | Concentration Limit ($Ci/m^3$) |
|---|---|
| Ac-227 | 1.2E–02 |
| Ag-108m | 1.0E–04 |
| Al-26 | 2.8E–05 |
| Am-241 | 8.5E–04 |
| Am-243 | 4.8E–04 |
| Ba-133 | 8.9E+00 |
| Be-10 | 3.4E–01 |
| Bi-207 | 1.7E–03 |
| Bk-247 | 5.2E–04 |
| C-14 | 1.5E–02 |
| Ca-41 | 3.5E–02 |
| Cf-249 | 3.6E–04 |
| Cf-251 | 4.9E–04 |
| Cf-252 | 2.1E+01 |
| Cl-36 | 3.7E–05 |

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 3. Solid Low-Level Waste (LLW) (Cont.) (Page 7 of 15)**

**Table 3-2. LANL Waste Acceptance Criteria for Solid Low-Level Waste (LLW) Disposal in Pit 37, 38, and 39 Headspace (Cont.)**

| Radionuclide | Concentration Limit (Ci/m$^3$) |
|---|---|
| Cm-243 | 2.3E–02 |
| Cm-244 | 1.4E–01 |
| Cm-245 | 5.7E–04 |
| Co-60 | 6.0E+03 |
| Cs-135 | 3.9E–02 |
| Cs-137 | 6.7E–03 |
| Eu-152 | 1.7E–01 |
| Eu-154 | 9.9E+00 |
| Gd-148 | 1.3E–02 |
| H-3 | 8.6E+01 |
| Ho-166m | 8.2E–05 |
| I-129 | 1.7E–03 |
| K-40 | 3.4E–04 |
| Kr-85 | 7.8E+02 |
| Lu-176 | 1.3E–03 |
| Mo-93 | 3.7E–02 |
| Nb-93m | 9.2E+02 |
| Nb-94 | 7.1E–05 |
| Ni-59 | 1.4E+00 |
| Ni-63 | 1.7E+00 |
| Np-237 | 2.5E–04 |
| Os-194 | 2.4E+04 |
| Pa-231 | 6.7E–05 |
| Pb-210 | 2.3E–02 |
| Pm-145 | 3.7E+01 |
| Pu-236 | 5.5E–03 |
| Pu-238 | 2.4E–03 |
| Pu-239 | 6.3E–04 |
| Pu-240 | 6.7E–04 |
| Pu-241 | 2.5E–02 |
| Pu-242 | 6.5E–04 |
| Pu-244 | 2.1E–04 |
| Ra-226 | 4.2E–05 |
| Ra-228 | 1.0E+03 |
| Si-32 | 6.3E–02 |
| Sm-146 | 4.3E–03 |
| Sm-151 | 8.9E+00 |
| Sn-121m | 3.8E+00 |
| Sn-126 | 1.0E–02 |
| Sr-90 | 1.7E–02 |
| Tb-157 | 4.6E+00 |
| Tc-97 | 2.3E–02 |
| Tc-99 | 2.7E–03 |

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 3. Solid Low-Level Waste (LLW) (Cont.) (Page 8 of 15)**

**Table 3-2. LANL Waste Acceptance Criteria for Solid Low-Level Waste (LLW) Disposal in Pit 37, 38, and 39 Headspace (Cont.)**

| Radionuclide | Concentration Limit (Ci/m$^3$) |
|---|---|
| Th-228 | 6.2E+17 |
| Th-229 | 2.7E–04 |
| Th-230 | 9.8E–05 |
| Th-232 | 3.2E–05 |
| Ti-44 | 3.1E–04 |
| U-232 | 2.4E–04 |
| U-233 | 1.7E–03 |
| U-234 | 3.7E–03 |
| U-235 | 9.1E–04 |
| U-236 | 4.9E–03 |
| U-238 | 2.7E–03 |
| Zr-93 | 6.0E–01 |

**Table 3-3. Class-C Concentration Limits for Radionuclides in Volume-Contaminated Solid Low-Level Waste (LLW)**

| Radionuclide | Concentration (Ci/m$^3$) |
|---|---|
| C-14 | 8.0E+00 |
| C-14 in activated metal | 8.0E+01 |
| Ni-59 in activated metal | 2.2E+02 |
| Ni-63 | 7.0E+02 |
| Ni-63 in activated metal | 7.0E+03 |
| Sr-90 | 7.0E+03 |
| Nb-94 in activated metal | 2.0E–01 |
| Tc-99 | 3.0E+00 |
| I-129 | 8.0E–02 |
| Cs-137 | 4.6E+03 |
| Alpha-emitting transuranic nuclides with half-life greater than five years | 1.0E+02[a] |
| Pu-241 | 3.5E+03 [a] |
| Cm-242 | 2.0E+04 [a] |

Source: (10 CFR 61.55, *Waste Classification*)
[a)] Units are nCi/g

**Table 3-4. Radiological Assay Methods for Characterization of Low-Level Waste (LLW)**

| Radiation Type | Typical Radionuclides | Contamination | Appropriate Detection Instrumentation |
|---|---|---|---|
| Alpha[a] | Isotopes of Am, Pu, U, Th, Ra, Po | Volume | Gas proportional (i.e., gross alpha/beta), liquid scintillation, alpha spectroscopy |
| Alpha | Isotopes of Am, Pu, U, Th, Ra, Po | Surface | Gas proportional, liquid scintillation, alpha spectroscopy, portable survey meter[b], smear counter[b], Long-Range Alpha Detector (LRAD)[c] |
| Beta[a] | H-3, C-14, Sr-90 Y-90, Tc-99, fission products | Volume | Liquid scintillation, gas proportional, calorimetry |
| Beta | H-3, C-14, Sr-90 Y-90, Tc-99, fission products | Surface | Liquid scintillation, gas proportional, portable survey meter, smear counter |
| Gamma | Most activation and fission Products, U-235, U-238, Am-241 | Volume or Surface | Gamma spectroscopy (NaI, GeLi, HPGe) |
| Neutron | U-233, U-235, Pu-238, Pu-239, Cf-252 | Volume or Surface | Passive/active neutron scanner |

a) Many radionuclides that are primarily alpha or beta emitters will also emit gamma-rays and/or x-rays a significant fraction of the time, making gamma spectroscopy an appropriate assay method.
b) Portable survey meters and smear counters are designed for detecting radioactive contamination and not for quantifying activity; however, they can be used to infer the total activity when the waste stream has been well characterized by other methods. Direct surveys with portable meters and smear counters should be used to determine the activity in waste only when contamination levels are relatively low (i.e., activity is inferred to be less than 10 nCi/g) and when appropriate characterization methods are not readily available.
c) LRAD is a detection technology that can be used to determine the alpha activity of a surface-contaminated waste stream. Applications for the LRAD are being developed at LANL by N2, Advanced Nuclear Technology group.

### *3.2.2 Greater-than-Class-C (GTCC) Radionuclides*

GTCC waste, as defined by 10 CFR 61.55, *Waste Classification*, generated by United States (US) Nuclear Regulatory Commission (NRC) licensees must not be accepted for disposal at Area G.

### *3.2.3 Radionuclide Disposal Limits*

Concentration limits for radionuclides included in the TA-54, Area G performance assessment and composite analysis are listed in Tables 3-1 and 3-3. It is important that WM-LSVS receives accurate characterization data for these radionuclides. Therefore, Table 3-4 should be used to determine the preferred radiological assay method. LLW contaminated with tritium greater than 20 mCi/m$^3$ must also meet the requirements of Attachment 5, *Tritium-Contaminated Waste*.

***Note:*** Waste containers with tritium contamination (volumetric or surface) in excess of 3.8 pCi/g require documented surveys before acceptance at TA-54.

Operational waste that is disposed of a minimum of 3 m (9.8 ft.) below operational (current) grade must comply with the radionuclide concentration limits listed in Table 3-1. Low-activity waste that consists of bulk soils and debris and that is generated as a result of environmental restoration and decontamination and decommissioning activities may be disposed of within pits between a plane that lies 3 m (9.8 ft) below operational grade and a plane that lies 0.3 m (1 ft.) below the interface of site surface soils (crushed tuff) and the underlying intact tuff, to the extent that radionuclide concentrations in the waste do not exceed the limits listed in Table 3-2.

### *3.2.4 Fissile Radionuclides*

The fissile or fissionable isotope content in Pu-239 Fissile Gram Equivalent (FGE) of LLW packages must not exceed the values shown in Table 3-5 (Criticality requirement):

***Note:*** Generators must use the FGE values in Table 2-2 of Attachment 2, *Contact-Handled Transuranic (TRU) Waste*, to determine fissile quantities in LLW containers.

***Note:*** Generators are not required to count the FGE content of natural and/or depleted uranium (i.e., uranium enriched to <0.93 wt% U-235) toward the criticality safety limits.

**Table 3-5. Fissile Gram Equivalent (FGE) Content for Low-Level Waste (LLW) Packages**

| If | Then |
|---|---|
| Packages are smaller than 55 gal. | The total FGE must not exceed 10 g. |
| Drums are 55 gal. or larger, but are smaller than 90 $ft^3$ | The total FGE must not exceed 275 g. |
| Metal boxes are 90 $ft^3$ or larger | The total FGE must not exceed 350 g. |
| The container is a dumpster (total of all packages) | The total FGE must not exceed 350 g. |
| Un-containerized Low-Level Waste (LLW) | The average FGE loading must not exceed 0.1 g/L. |

***Note:*** If more than 15 g of fissile isotopes are packaged together, they may constitute a fissile material under Department of Transportation (DOT) regulations and may not be acceptable for transport in a DOT Industrial Package (IP).

### *3.2.5 Radionuclide Reporting Requirements*

If reporting radionuclides for waste destined for NNSS, refer to P930-1, LANL WAC, Attachment 17, *Waste Acceptance at the Nevada National Security Site (NNSS)*.

Generators must report all radionuclides that meet the following criteria:

- They make up greater than 1% of the total activity,
- They are listed in either Section 3.2.1 or Table 3-1 and are present in quantities greater than 1% of the upper limit, or
- They are required to be reported on a shipping paper in accordance with 49 CFR 173.433(f), *Requirements for determining basic radio-nuclide values, and for the listing of radionuclides on shipping papers and labels*.

Daughter radionuclides known to be in secular equilibrium with a longer-lived parent at the time of assay are not reported. Other daughter radionuclides must be reported if they meet the criteria above. If more than one of the radionuclides in Section 3.2.1 and Table 3-1 are known to be in the waste, the sum-of-the-fractions rule applies. The generator should consult Waste Disposition Project (WDP) personnel if the following equation cannot be met:

$$\sum_{i=1}^{n} \frac{C_i}{L_i} \leq 1$$

where

*i* = radionuclide

*Ci* = concentration (Ci/g) of the $i^{th}$ radionuclide

*Li* = concentration limit from Tables 3-1 or 3-2 (*Ci/g*)

*n* = total number of radionuclides present

See Table 3-4 for preferred radiological assay methods.

## 3.3 Container Requirements

Shipments of LLW destined for disposal must comply with applicable DOT specifications in 49 CFR 173, Subpart B, *Preparation of Hazardous Materials for Transportation*.

Due to limited remaining disposal capacity within TA-54, Area G, the size of containers acceptable for disposal must be limited. Generators should preferentially use soft-sided containers, 55 gallon drums or B-12 or B-25 boxes for disposal whenever possible.

### *3.3.1 General Requirements*

Waste must be packaged so that it does not present a hazard during handling or disposal operations. Packages used for waste must meet all of the following requirements (according to ABD-WFM-002, Appendix B):

- Be made of a material that will not react with the waste.
- Be in good condition, with no leaks, rusting, dents, bulges, or other structural defects that could impair the integrity or safe handling of the container.
- Be as full as possible with minimum void space. The void space within the waste or the waste package must not exceed 10%.
- Be capable of withstanding stresses associated with loading, handling, stacking and shipping of wastes.

LLW must be packaged in the following:

- Metal boxes,
- Metal or polyethylene drums,
- Bulk packaging, or
- Super sacks or soft-sided containers.

Generators must contact Waste Management-Services (WM-SVS) personnel for guidance if they find it difficult to package items and/or minimize the void space.

The following sections describe the packaging requirements for routine LLW. This is followed by unique requirements for specific waste types.

### *3.3.2 Irradiation Sources*

Many irradiation sources require special packaging because of their high activity concentration and/or their high external dose rates. For this reason, generators who wish to dispose of irradiation sources with activities in excess of 1 µCi must notify WM-SVS personnel before submitting the on-line WDR, found in WCATS, for approval.

### *3.3.3 Beryllium and/or Carbon*

Beryllium waste must be double-bagged or double wrapped and placed in approved DOT containers. The waste generator must contact WM-SVS personnel for further instructions if the characteristics (i.e. size) of the waste prohibit packaging into an approved DOT container.

Waste must not have beryllium and/or carbon totaling greater than 20% by weight in the waste matrix (criticality requirements).

### *3.3.4 Classified Waste*

Containers used for packaging classified waste must have a diameter of less than 0.9 m (3 ft) to facilitate shaft disposal. Items that do not meet this size requirement will be handled on a case-by-case basis.

### *3.3.5 Uranium Chips and Turnings*

Containers used for packaging uranium chips and turnings must meet the following requirements:

- Each package of chips and turnings must be in a 30-gal. drum with a 55-gal. drum overpack,
- Each 30-gal. drum must be filled only to 2/3 capacity, and
- The annulus between the 30-gal. drum and 55-gal. drum must be filled with vermiculite.

## 3.4 Package Weight

Packages must not exceed the rated capacity of the container based on DOT-specified package certification tests for the contained material.

### *3.4.1 Lead Shielding*

The use of lead for shielding (radioactively contaminated or radioactively uncontaminated) in containers for the disposal of LLW is an acceptable practice. Generators must include the following with the WSP:

- Documentation demonstrating that standard packaging without lead shielding would not reduce the exposure rate to less than 0.005 rem/h (5 mrem/h) at 30 cm and that the shielding is necessary for radiation protection; and
- Documentation demonstrating that the amount of lead used for shielding is not excessive for each specific container of LLW. The documentation must include calculations demonstrating the amount of lead (thickness and quantity) in the container is not excessive by justifying the quantity of lead required in each given container, or on a container-by-container basis

## 3.5 External Package Contamination/Dose Rate

Removable surface contamination must not exceed the limits established by P121, *Radiation Protection.*

## 3.6 Package Marking and Labeling

Packages of LLW must be marked and labeled according to DOT requirements. In addition, each package must be marked with the following:

- A Health Physics Radioactive Material Tag displayed on each outer waste container or included with the shipping package.
- ”C” for compactable waste or “NC” for noncompactable waste.
- “CAUTION—RADIOACTIVE WASTE” tape.
- The item identification number (barcode) provided by Environmental Protection–Environmental Data and Analysis (ENV-EDA).
- The Technical Area (TA), building, and room number where the waste originated.
- The package weight in kilograms.
- The contact and 1-m exposure rates in mrem/h written on the receiving report and on the Health Physics Radioactive Material Tag.
- Major radionuclides in the waste.
- The radioactive waste sealed date.

***Note***: The label provided by WDP includes all of the required information EXCEPT for the date sealed and the item identification number. Item identification labels are not to be altered in any way.

Beryllium waste must be marked with the warning shown in Fig. 3-1.

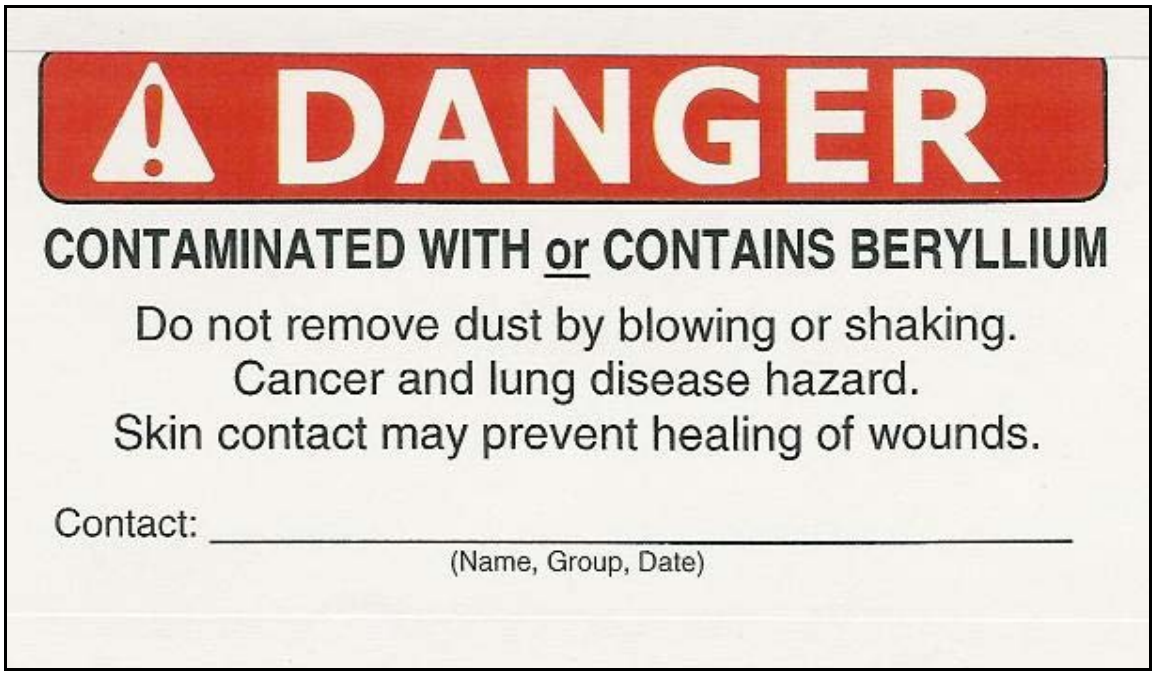


**Fig. 3-1. Warning sign for beryllium waste.**

## 3.7 Additional Requirements

### *3.7.1 Waste Handling*

Area G has equipment available for the off-loading and handling of waste containers weighing 13,500 kg (15 tons) or less. If the weight of the waste exceeds the capacity of the equipment available at Area G, the generator must provide the means to off-load the waste.

### *3.7.2 Center of Gravity*

LLW packages that have abnormal centers of gravity must be clearly marked with the center of gravity. Top-heavy loads are severely discouraged, and bulk waste shipments with complex geometries must be loaded in the most stable configuration.

### *3.7.3 Scheduling*

Generators must schedule shipments of LLW at least five (5) working days in advance. Waste shipped under a road closure may be scheduled for receipt at Area G. If gate times cannot be met, rescheduling or cancellation needs to take place with at least one day of notice before the shipping date. Shipments not received within 30 minutes of scheduled gate time will not be accepted and must be rescheduled for a later date. Contact (505) 665-0957 or e-mail lowlevel@lanl.gov to schedule shipments.

### *3.7.4 Documentation*

LLW must be approved before shipment to Area G. The WSP and the on-line WDR, found in WCATS, must be completed by the generator and approved by WDP. All documentation (e.g., characterization data or acceptable knowledge documentation) referenced in the WSP or on-line WDR must be readily available to WDP at the time of submittal. WSPs relying on Acceptable Knowledge (AK) as the characterization method will not be approved unless they are submitted with a complete AK package. A copy of the on-line WDR, an Area G Receiving Report, and a waste manifest must accompany the shipment, which then becomes the shipping package. The Area G Receiving Report must include contact and 1 meter exposure rates in mrem/h and have a Radiological Control Technician's (RCTs) signature and date. If these items are not included on the Area G Receiving Report the waste may not be accepted until the necessary information is obtained. If an exemption or exception is received, the approved WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) must also accompany the shipment. Along with the WEF, a Nuclear Criticality Safety Evaluation (NCSE) must be performed when the WAC requirements cannot be met for fissile material in a waste package (see Attachment 17, *Waste Acceptance at the Nevada National Security Site [NNSS]*, Section 17.2.1, *Nuclear Criticality Safety).* The purpose of the NCSE is to ensure waste from a generator site location that may not meet disposition requirements can be documented for support of the waste to ship and to be processed/stored at the disposal facility.

For LLW, an on-line WDR describes a shipment; therefore, an on-line WDR must not be split into multiple loads. An on-line WDR is only valid for six (6) months from the date of approval.

### *3.7.5 Classified Waste*

If it is not possible to declassify LLW before disposal, documentation demonstrating that it is either impossible or unfeasible to declassify the LLW before disposal should be prepared. Where possible, this documentation should be developed in such a manner that it does not include classified information. When the documentation does not include classified information. When the documentation does not include classified information, it must be submitted with the WSP. If the documentation cannot be developed without including classified information, it must not be submitted with the WSP but must instead be maintained in the waste generator's files, and LLW Operations Manager review and approval of justification not to declassify must be obtained in another, appropriate manner.

Upon approval from the LLW Operations Manager, the generator must transport the classified waste to the disposal site at Area G and provide two Q-cleared personnel, one of whom must be a Los Alamos National Security, LLC (LANS) employee, to witness the disposal.

### *3.7.6 Criticality Requirements*

Specific criticality requirements and safety practices for disposal of LLW at TA-54, Area G, are identified throughout this WAC section. These requirements are based on the *Criticality Safety Evaluation for the TA-54 Low Level Waste (LLW) Burial Pits with Normal LLW Matrices and Specific TA-18 Relocation Project Materials*, NCS-CSED-07-046, November 13, 2007.

### *3.7.7 Waste Transfer Requirements*

Waste may be staged for 90 days, and then must be moved to storage or to a Treatment, Storage, and/or Disposal Facility (TSDF). Radioactive waste must be shipped from a registered radioactive waste area to maintain certification.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 4. Removed and Reserved**

Attachment Reserved

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 5. Tritium-Contaminated Waste (Page 1 of 4)**

Tritium-contaminated waste consists of any matrix that contains tritium, a radioactive isotope of hydrogen. The Waste Acceptance Criteria (WAC) in this attachment apply to tritium-contaminated waste containing tritium concentrations greater than 20 mCi/m$^3$ that is destined for storage or disposal at Technical Area (TA)-54. Tritium-contaminated wastes with tritium concentrations less than or equal to 20 mCi/m$^3$ are exempt from the requirements of this attachment. Waste containers with tritium contamination (volumetric or surface) in excess of 3.8 pCi/g require documented surveys before acceptance at TA-54.

All tritium-contaminated solid wastes must meet the applicable requirements in the following attachments:

- Attachment 2, *Contact-Handled Transuranic (TRU) Waste*
- Attachment 3, *Solid Low-Level Waste (LLW)*
- Attachment 7, *Mixed Low-Level Waste (MLLW)*
- Attachment 17*, Waste Acceptance at the Nevada National Security Site (NNSS)*

## 5.1 Container Requirements and Package Contents

Because of its high environmental mobility, tritium-contaminated waste must be packaged according to a unique set of requirements. Adequate packaging of tritium-contaminated waste must address the following:

- the form of the tritium (gas or water vapor),
- the activity concentration of the tritium, and
- the potential for generating gases.

These requirements are summarized in Table 5-1 of this attachment.

### *5.1.1 Package Weight*

The package weight must not exceed the rated capacity of the container based on Department of Transportation (DOT)-specified package certification tests for the contained material.

Containers that are designed to handle over-pressurization from gas generation will normally have enough structural integrity to handle the weight of the package contents.

### *5.1.2 External Package Contamination*

Removable surface contamination must not exceed the limits established in P121, *Radiation Protection*.

### *5.1.3 Package Marking and Labeling*

Packages of tritium-contaminated LLW must be marked and labeled as described in Section 3.6 of Attachment 3, *Solid Low-Level Waste (LLW)*. Packages of tritium-contaminated mixed LLW must be marked and labeled as described in Section 7.6 of Attachment 7, *Mixed Low-Level Waste (MLLW)*. Packages of tritium-contaminated TRU waste must be marked and labeled as described in Section 2.6 of Attachment 2, *Contact-Handled Transuranic (TRU) Waste*.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 5. Tritium-Contaminated Waste (Cont.) (Page 2 of 4)**

**Table 5-1. Tritiated Waste Packaging Requirements**

| Package Concentration | Waste Description | Packaging Requirements |
|---|---|---|
| Less than or equal to 20 mCi/m$^3$ | Low-activity solid waste | These wastes are exempt from the requirements of this attachment but must meet the applicable requirements of Attachments 2, 3, 4, and 7 of this document. |
| Greater than 20 mCi/m$^3$ and less than or equal to 40 Ci/m$^3$ at the time of packaging in a sealed Weapons Engineering Tritium Facility (WETF) primary tririum containment vessel | Low-activity solid wastes or absorbed liquids | Disposal containers must be DOT-approved metal boxes or metal drums.<br>Total residual liquids must meet the requirements specified in Section 5.2 of this attachment.<br>Tritiated water must be absorbed on molecular sieve or equivalent zeolite material. Water loading must not exceed the manufacturer's recommended equilibrium water capacity. Tritium loading must be limited to prevent over-pressurization of the primary container beyond the design pressure rating.<br>Acceptable absorbents for oil include vermiculite or other inorganic absorbent material.<br>The total volume of tritium-contaminated oil must not exceed 20% of the volume of absorbent material. |
| Greater than 40 Ci/m$^3$ and less than 500 Ci/pkg | Moderate-activity solid waste | Disposal containers must be stainless-steel drums or containers.<br>Total residual liquids must meet the requirements specified in Section 5.2 of this attachment.<br>Tritiated water must be absorbed on molecular sieve or equivalent zeolite material. Water loading must not exceed the manufacturer's recommended equilibrium water capacity.<br>Acceptable absorbents for oil include vermiculite or other inorganic absorbent material.<br>Waste form must be intrinsically stable or be stabilized by the generator.<br>Tritium loading must be limited to prevent over-pressurization of the disposal container beyond the design pressure rating.<br>The tritium off-gassing rate must be evaluated to ensure that its annual release fraction will remain below 1E–02 from the disposal container.<br>The waste generator must develop documentation at the appropriate degree of rigor (e.g., scientific calculations, engineering design, results of testing, etc.) that shows how the disposal container meets the design pressure rating and tritium off-gassing limits. The documentation must be submitted with the Waste Stream Profile (WSP) and maintained in the generator's files. |

**Table 5-1. Tritiated Waste Packaging Requirements (Cont.)**

| Package Concentration | Waste Description | Packaging Requirements |
|---|---|---|
| Greater than or equal to 500 Ci/pkg and less than 100,000 Ci/pkg at the time of packaging in a sealed WETF primary tritium containment vessel | High-activity waste | Disposal containers must be welded stainless steel or stainless steel with machined metal flanges and metal gaskets.<br>Total residual liquids must meet the requirements specified in Section 5.2 of this attachment.<br>Tritiated water must be absorbed on molecular sieve or equivalent zeolite material. Water loading must not exceed the manufacturer's recommended equilibrium water capacity.<br>Acceptable absorbents for oils include vermiculite or other inorganic absorbent material.<br>The total volume of tritium-contaminated oil must not exceed 20% of the volume of absorbent material.<br>Tritium loading must be limited to prevent over-pressurization of the primary container beyond the design pressure rating.<br>Tritium off-gassing rate must be evaluated to ensure that its annual release fraction will remain below 1E–04 from the disposal container.<br>The waste generator must develop documentation at the appropriate degree of rigor (e.g., scientific calculations, engineering design, results of testing, et.) that shows how the disposal container meets the design pressure rating and tritium off-gassing limits. The documentation must be submitted with the WSP and maintained in the generator's files. |

### *5.1.4 General Requirements*

Containers used to package tritium waste must meet the following general packaging requirements:

- Be made of a material that will not react with the waste,
- Be in good condition, with no leaks, rusting, dents, bulges, or other structural defects that could impair the integrity or safe handling of the container, and
- Be capable of withstanding stresses associated with loading, stacking and shipping of wastes.

## 5.2 Low-Activity, Tritium-Contaminated Waste

Wastes with tritium concentrations greater than 20 mCi/m$^3$ but less than 40 Ci/m$^3$ are suitable for shallow land burial and must be placed in DOT-approved metal drums or metal boxes. Residual liquids must meet the requirements specified in Section 3.1.1 of Attachment 3, *Solid Low-Level Waste (LLW)*. The total volume of tritium-contaminated oil must not exceed 20% of the volume of absorbent material.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 5. Tritium-Contaminated Waste (Cont.) (Page 4 of 4)**

### 5.3 Moderate-Activity Tritium-Contaminated Waste

Wastes with tritium concentrations greater than 40 Ci/m$^3$ and a total tritium activity of less than 500 Ci per package must be packaged in stainless-steel containers. Absorbed liquids with tritium concentrations greater than 40 Ci/m$^3$ and less than 500 Ci per package must be packaged in stainless-steel drums or containers with manufacturer-supplied O-rings or elastomer seals. The average annual leak fraction for each disposal container must be demonstrated to be less than 1.0E–02.

Moderate-activity tritium-contaminated waste must be intrinsically stable or be stabilized by the generator. The total volume of residual liquids must be as low as reasonably achievable and meet the requirements specified in Section 3.1.1 of Attachment 3, *Solid Low-Level Waste (LLW)*. The total volume of tritium-contaminated oil must not exceed 20% of the volume of absorbent material.

### 5.4 High-Activity Tritium-Contaminated Waste

The generator must take special precautions to ensure that high-activity tritium waste (absorbed tritiated water greater than 500 Ci per package and less than 100,000 Ci per package) does not easily migrate from its disposal container. The generator must use welded stainless steel containers or stainless steel containers with machined metal flanges and metal gaskets. The pressure capacity of the primary containers should be rated to handle the over-pressurization expected from gas generation within the container. The average annual leak fraction for each container must be demonstrated to be less than 1.0E–04. High-activity, tritium-contaminated waste is usually in the form of tritiated water ($H_3O$) in water ($H_2O$) absorbed on molecular sieve beds. The weight fraction of the total water content on the molecular sieve (or equivalent zeolite material) must not exceed the manufacturer's recommended equilibrium water capacity. The total activity of tritium on the molecular sieve must be limited to an amount that will not cause the container to pressurize above its design pressure rating during the first 10 half-lives of tritium (124 yr). The total pressurization of the container must include the pressure expected from both tritium decay and the radiolysis of hydrogen gas off the molecular sieve. Containers will not be accepted for disposal if the hydrogen gas concentration in the container void volume exceeds 4% at the time of disposal.

### 5.5 Tritium-Contaminated Mixed Waste

The generator must take into account the hazards involved with both the tritium and the hazardous components when packaging mixed waste. To ensure proper packaging of the hazardous component, the generator must comply with Attachment 7, *Mixed Low-Level Waste (MLLW)*, of this document. To ensure the proper packaging of the tritium component, the generator must comply with the above requirements. Packaging requirements for moderate-and high-activity, tritium-contaminated mixed wastes are determined on a case-by-case basis by Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW).

### 5.6 Tritium-Contaminated Transuranic (TRU) Waste

The generator must package tritium-contaminated TRU waste according to the requirements in Attachments 2 and 5 of this document. The generator should isolate the radioactive contents from any hydrogenous materials in the waste container. Low-activity, tritium-contaminated TRU wastes (i.e., those with less than 10 Ci/m$^3$) can simply be packaged as TRU waste with no additional requirements. Packaging requirements for moderate- and high-activity, tritium-contaminated TRU wastes are determined on a case-by-case basis by the LANL TRU Program (LTP). LTP may be contacted at 667-7111.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 6. Hazardous and Universal Waste (Page 1 of 4)**

Hazardous waste, in a general sense and for the purpose of this document, is nonradioactive waste that exhibits any of the characteristics listed in 40 CFR 261, *Identification and Listing of Hazardous Waste,* Subpart C; or is identified as hazardous waste as specified in 40 CFR 261.3, *Definition of Hazardous Waste*. Universal waste includes nonradioactive hazardous waste batteries, pesticides, Mercury Containing Equipment (MCE), mercury thermostats, mercury thermometers, and lamps, and is defined in 40 CFR 273, *Standards for Universal Waste Management*. Universal waste is managed under the universal waste requirements specified in 40 CFR 273. These requirements were adopted by the New Mexico Environment Department (NMED) as New Mexico Administrative Code (NMAC) 20, *Environmental Protection*, Chapter 4, Part 1, *Hazardous Waste Management*. Aerosol cans that are not radioactively contaminated can now be managed as universal waste in accordance with NMAC 20.4.1.1001, *Modifications, Exceptions and Omissions*. Hazardous and universal wastes are both regulated by NMED through the Hazardous Waste Management Regulations and the Hazardous Waste Act. If hazardous waste will be stored in a permitted storage Area at Technical Area (TA)-54, it must meet the permitted Waste Analysis Plan *before* being shipped to the storage area. In addition, the waste acceptance requirements may change. Contact the hazardous and mixed waste permitting personnel at Environmental Protection-Water Quality and RCRA (ENV-RCRA) for assistance with waste acceptance relative to permitted storage units.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures, and the Waste Acceptance Criteria regarding allowable radiological levels of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

***Note:*** For waste that is both Resource Conservation and Recovery Act (RCRA)-hazardous and Polychlorinated Biphenyl (PCB) contaminated, refer also to Attachment 11, *Polychlorinated Biphenyl (PCB) Waste.*

## 6.1 Waste Form Restrictions

There are no restrictions on the forms of hazardous and universal waste that can be stored at TA-54. Solid, liquid, gas, semi-solid, suspended solids, sludge, and any other physical form of hazardous and universal waste can be stored at TA-54.

Department of Transportation (DOT) Class 1 materials or any type of Resource Conservation and Recovery Act (RCRA)-regulated waste not listed in Attachment 8, *Other Low-Level Waste (LLW)*, of LANL's Hazardous Waste Facility Permit will not be accepted for storage at TA-54. There is no on-site disposal option for nonradioactive classified waste. Generators must declassify the items so that the material can be salvaged or disposed of off-site. Unacceptable waste includes the following:

- Dioxins (case-by-case determination)
- DOT Class 1 as defined in 49 CFR 173.50, *Shippers—General Requirements for Shipments and Packagings, Class 1—Definitions*
- Classified nonradioactive waste
- Unknowns
- Waste containing >10 ppm peroxide, waste containing unreacted constituents in a single package, and >1% explosive solid or >10% explosive in solution

## 6.2 Package Contents

Unknown wastes will not be accepted for storage at TA-54. A waste profile must be completed and approved before waste acceptance at TA-54. Small quantities of unknown waste (4 liters [1 gal.] or less for liquids; 300 g [0.66 lb] or less for solids) may be eligible for the hazardous waste categorization program. In this program, unidentified waste can be characterized using field kits. Contact the ENV-RCRA group for assistance with the hazardous waste categorization program.

Solid and liquid wastes must not be combined in one container, except in the case of non-RCRA and non-DOT regulated material. In addition, each waste type placed or accumulated in a container must be compatible with all other waste types in the container. Universal waste batteries must be segregated by type (e.g., lead-acid, nickel-cadmium, mercury, lithium). Incompatible wastes must be segregated regardless of whether they are hazardous or universal waste.

## 6.3 Container Requirements

Hazardous and universal waste must be packaged according to DOT regulations for the hazardous properties of the waste. The container must be in good condition, without severe rust, dents, deep scratches, bulges, or other structural defects. The container must be compatible with the waste it contains and must be closed according to DOT specifications.

Gas cylinders must also meet specific criteria to be accepted for transport. The cylinders must not have welded seams, must have the appropriate valve, and must be DOT-approved for the contained material. Specific criteria for gas cylinders are identified in 49 CFR 178, Subpart C, *Specifications for Cylinders*.

Universal waste lamps may be packaged in strong fiberboard boxes, or containers, or the original manufacturer's container with no more than 1% of the shipment containing broken bulbs. These boxes must have all seams and joints sealed with self-adhesive, pressure-sensitive tape. Universal waste boxes containing universal lamps must have a Universal Waste Label attached to one end of the box. MCE must be packaged to prevent breakage. If mercury spills or leaks from broken ampules, the resulting waste must be managed in accordance with P409, *Waste Management*. All mercury in liquid form must be packaged in a polyethylene outer container.

### *6.3.1 Container Capacity*

Each waste container must comply with the following capacity criteria, as applicable:

- Waste must be prepackaged to meet DOT specifications.
- Glass not to exceed four liters
- Other containers with a volume of less than 19 liters (5 gal.) and <50 lb must be placed in DOT-approved combination packaging or a lab-pack container in accordance with 49 CFR 173.12, *Exceptions for Shipment of Waste Materials*.
- Containers with a volume greater than 5 gal. or >50 lbs must be packaged in DOT-approved single packaging (no combination packaging).

### *6.3.2 Lab Pack Criteria*

For waste to be considered for lab packing, the criteria of 49 CFR 173.12 must be met. The generator must repackage any waste or overpack any waste container that does not meet the applicable acceptance criteria.

### *6.3.3 Headspace in Containers with Liquid*

According to 49 CFR 173.24, *General Requirements For Packagings and Packages*, (h), sufficient ullage (outage or headspace) must be left when filling receptacles with liquids. Liquids may expand due to temperature changes during transportation. Headspace must be sufficient to prevent leakage or permanent distortion of the packaging or receptacle resulting from this expansion. Liquids must not completely fill a receptacle at a temperature of 131ºF or less (49 CFR 173.24a[d]). Containers must not be filled with liquids to more than 85% of their rated capacity. For example, the Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW) group has determined that a 6-in. headspace should be left in a 55-gal. drum.

## 6.4 Package Weight

The maximum acceptable net weight is the rated capacity of the container based on United Nations (UN)-specified package certification tests for the contained material. The maximum acceptable gross weight for lab-packed waste is 205 kg (452 lb) or the rated capacity of the container, whichever is less.

## 6.5 External Chemical Contamination of Package

There must be no external chemical contamination on any waste package. Contaminated packages must be overpacked, or the waste must be repackaged.

## 6.6 Package Marking and Labeling

Each container of hazardous or universal waste must have

- A hazardous or universal waste marking,
- The universal waste marking must be placed on one end of each 4-ft or 8-ft lamp box,
- The DOT-required labels, and
- Containers holding free liquids need to be marked “free liquids.”

The hazardous or universal waste marking must contain

- The generator’s name and address,
- The accumulation start date if coming from a <90 day, universal area, and
- The DOT proper shipping name and identification number.

***Note:*** It is the generator’s and/or Waste Management Coordinator’s (WMC’s) responsibility to fill in the correct starting accumulation date on the universal waste label.

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**Attachment 6. Hazardous and Universal Waste (Cont.) (Page 4 of 4)**

## 6.7 Additional Requirements

For hazardous waste stored in a less-than-90-day Storage Area destined for permitted storage at TA-54, Area L or Area G, the disposal request for the waste must be submitted on or before day 30. A Waste Acceptance Criteria (WAC) exception form can be used if the generator does not meet the deadline.

For hazardous waste stored at a LANL Treatment, Storage, and/or Disposal Facility (TSDF) outside TA-54, the disposal request for the waste must be submitted at least six months before exceeding the storage requirement to be shipped directly off-site to an approved TSDF.

For universal waste stored in a universal waste storage area, the disposal request for the waste must be submitted at least six months before exceeding the storage time requirement limit of one year.

In all instances, the oldest accumulation start date must be reflected when there are multiple containers listed on the disposal request.

For hazardous waste stored at a satellite accumulation area, the on-line Waste Disposition Request (WDR), found in WCATS, must be submitted before exceeding 45 gal. of RCRA hazardous waste or 1 qt of acutely hazardous waste.

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**Attachment 7. Mixed Low-Level Waste (MLLW) (Page 1 of 13)**

Mixed Low-Level Waste (MLLW) is Low-Level Waste (LLW) that contains a Resource Conservation and Recovery Act (RCRA)-listed or characteristic hazardous waste as identified in 40 CFR 261, *Identification and Listing of Hazardous Waste*. Both the Atomic Energy Act and RCRA regulate this type of waste. MLLW in liquid, solid, and gaseous physical form may be stored at Technical Area (TA)-54. MLLW with a significant radioactive component must be stored at Area G, which is a nuclear facility. A significant radioactive component is an amount equivalent to 1/1,000 of the Department of Transportation (DOT) Reportable Quantity (RQ) for any radionuclide. The DOT RQ is found in 49 CFR 172.101, *Purpose and Use of Hazardous Materials Table*, Appendix A in Table 2.

MLLW must be stored, treated and disposed of in accordance with RCRA regulations. With the exception of limited quantities of MLLW used in on-site treatability studies and technology demonstrations, MLLW accepted for storage at TA-54 will eventually be treated off-site at either commercial facilities or other Department of Energy (DOE) sites. These facilities have intensive and prescriptive Waste Acceptance Criteria (WAC) and waste characterization requirements. For example, waste destined for Energy Solutions of Utah must have analytical data from a State of Utah-certified analytical laboratory.

Newly generated MLLW must be adequately characterized for off-site treatment and disposal so that the TA-54 MLLW long-term storage facility can be operated in a turn-key mode (MLLW is received and shipped without further consolidation, bulking, packaging, or characterization). DOE expects the generator of MLLW to prepare and characterize MLLW, as necessary.

LLW contaminated with tritium greater than 20 mCi/m$^3$ must also meet the requirements of Attachment 5, *Tritium-Contaminated Waste*.

## 7.1 Waste Form and Other Restrictions

There are no restrictions on the physical form of acceptable MLLW. However, there are prohibitions and restrictions on the chemical and radiological characteristics of the waste, including the following.

- Explosives are prohibited.
- Class-4 oxidizers are prohibited.
- Waste items with flammable liquids of volumes greater than 55 gal. are prohibited.
- Class-3 oxidizers are restricted to a volume of 1 liter per waste item.
- Class-3 oxidizers are restricted to an insignificant radiological component.
- Flammable gases are restricted to an insignificant radiological component.
- Flammable liquids are restricted to an insignificant radiological component.
- External package contamination and dose rates are restricted, as discussed in Attachment 3, Section 3.5.

An insignificant radiological component is defined as less than 0.1% of the activity listed in Appendix B of 40 CFR 302.4, *Designation of Hazardous Substances*

A Class-3 oxidizer is "[an] oxidizer that will cause a severe increase in the burning rate of combustible materials with which it comes in contact or that will undergo vigorous self-sustained decomposition due to contamination or exposure to heat" (National Fire Protection Association [NFPA] Standard Number 430). Typical Class-3 oxidizers are:

- Ammonium dichromate
- Calcium hypochlorite (over 50% by weight)
- Chloric acid (10% maximum concentration)
- Hydrogen peroxide solution (greater than 52% but not exceeding 91%)
- Mono-(trichloro)-tetra-(monopotassium dichloro)-penta-s-traizinetrione
- Fuming nitric acid (more than 86% concentration)
- Perchloric acid solutions (60% to 72% by weight)
- Potassium bromate
- Potassium chlorate
- Potassium dichloro-s-triazinetrione (potassium dichloroisocyanurate)
- Sodium bromate
- Sodium chlorate
- Sodium chlorite
- Sodium dichloro-s-trizinetrione

A Class-4 oxidizer is "[a]n oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock. In addition, the oxidizer will enhance the burning rate and can cause spontaneous ignition of combustibles" (NFPA 430). Typical Class-4 oxidizers are:

- Ammonium perchlorate (particle size greater than 15 µm)
- Ammonium permanganate
- Guanidine nitrate
- Hydrogen peroxide solution (greater than 91%)
- Tetranitromethane

***Note:*** If the particle size of ammonium perchlorate is less than 15 µm, it is classified as an explosive.

A WAC Exception may be requested for restricted waste; however, the acceptability of a restricted waste will depend on the current storage capacity and the overall radiological and physical inventory of the storage area. Exceptions will be considered on a case-by-case basis. Exceptions will not be approved for explosives or Class-4 oxidizers. In addition, exceptions will not be approved for flammable liquids, flammable gases, or Class-3 oxidizers where the radiological component exceeds 100% of the RQ.

### 7.2 Package Contents

Solid and liquid waste must not be deliberately combined in one container. All wastes placed or accumulated in a container must be compatible; incompatible wastes must be segregated.

High explosives and high-explosive residues are not acceptable in MLLW unless they are rendered inert and this process is documented. Biological wastes, biohazardous wastes, and other infectious or potentially infectious wastes are not acceptable in MLLW unless they are sterilized and this process is documented. This documentation must be submitted with the Waste Stream Profile (WSP).

Classified MLLW will not be accepted for storage at TA-54. Generators must declassify the item so that the material can be disposed of off-site.

Unknown MLLW will not be accepted for storage at TA-54. See Section 7.2.11 for information on no-owner waste.

For MLLW, a complete and specific characterization of the chemical and radiological content of the waste must be provided, including underlying hazardous constituents, if applicable (40 CFR 268, *Land Disposal Restrictions*). The description must include the waste matrix, each constituent of the waste (chemical and radioactive), each constituent's concentration or activity and limits of detection, and the hazardous properties of the waste (e.g., characteristic hazardous waste under RCRA). For MLLW, chemical and radiological characterization requires analytical results with detection limits below regulatory limits, as stated in subsequent sections. Acceptable Knowledge is appropriate only for certain waste streams (as stated in subsequent sections) and for describing the physical characteristics of the waste.

Because of the requirements of the off-site facilities, only chemical and radiological analytical results from approved laboratories will be accepted. To verify laboratory approvals, contact the Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW) group. The only allowable exceptions to this requirement are listed below.

Only MLLW with fully characterized radioactive components will be acceptable at TA-54. Estimates or assumptions regarding the amount of radioactive contamination will not be accepted. As stated in the foregoing sections, the amount of radioactive contamination must be determined by laboratory analysis.

Generators should contact Waste and Environmental Services–Waste Acceptance for guidance if their RCRA mixed wastes are approaching the 90-day RCRA storage limit but have not received the analytical results necessary for completion of the WSP and the on-line Waste Disposition Request (WDR), found in WCATS. The generator will need to notify Environmental Protection-Water Quality and RCRA (ENV-RCRA) by day 70 if they know they will exceed the 90-day storage limit. The extension must contain the following information: justification of why the extension is required, what has been done to date to move the waste, and a written action plan that ensures that the waste will be moved before the 30-day extension ends.

### *7.2.1 Non-Transuranic (TRU) Radionuclides*

Any non-TRU radionuclides known to be present in the waste must be identified and quantified. Tritium-contaminated MLLW must also meet the requirements of Attachment 5, *Tritium-Contaminated Waste*, with the exception that all MLLW containers must meet DOT requirements for shipment. To the extent possible, Chapter 14, Contamination Control, of P121, *Radiation Protection*, must be implemented for waste generated within a Radiation Control Area to eliminate the category of "suspect MLLW." Suspect MLLW will not be accepted; the generator must radiologically characterize the waste. These efforts must include documented acceptable knowledge, sampling and analysis, and direct reading measurements (for example, gamma measurements with high-purity germanium detectors).

### *7.2.2 Transuranic (TRU) Radionuclides*

Any TRU radionuclides known or suspected to be present in MLLW must be identified and quantified on the on-line WDR, found in WCATS, along with measurement uncertainties. Concentrations of TRU radionuclides in MLLW must not exceed 100 nCi/g of waste. Mixed waste having concentrations exceeding this limit is TRU waste (see Attachment 2, *Contact-Handled Transuranic (TRU) Waste*). It is especially important to minimize measurement uncertainties when the radioactive concentrations approach the TRU limit of 100 nCi/g. See Table 3-4 of Attachment 3, *Solid Low-Level Waste (LLW)*, for the preferred radiological assay methods.

### *7.2.3 Fissile Radionuclides*

The Technical Safety Requirements (TSRs) for TA-54, Area G, impose package limits for fissile material. These package limits are shown in Table 7-1.

**Table 7-1. Package Limits for Fissile Material**

| If | Then |
|---|---|
| Packages are smaller than 55 gal. | The total Fissile Gram Equivalent (FGE) must not exceed 10 g. |
| Packages are 55 gal. or larger | The total FGE must not exceed 275 g. |

### *7.2.4 Special Nuclear Material and Tritium*

The generator must ensure that all nuclear material accountability records and approvals are completed before the shipment of MLLW containing accountable quantities of special nuclear material (SNM) and tritium. Limitations may exist for waste containing greater than 1 gram of SNM or 1 curie of tritium. Contact WPS-HMLW for guidance.

### *7.2.5 Greater Than Class C (GTCC) Limitations*

MLLW with GTCC concentrations of radionuclides, which are prescribed in 10 CFR 61.55, *Waste Classification*, and presented in Table 3-3 of Attachment 3, *Solid Low-Level Waste (LLW)*, of this document, will not be accepted for storage at TA-54, Area G, nor Area L.

### *7.2.6 Reporting Requirements*

Suspect MLLW must not be accepted; the generator must radiologically characterize the waste. If no contamination is detected, the waste should be evaluated for free release. If the material cannot be free released and suspect radionuclides cannot be quantified, then the on- WDR, found in WCATS, must indicate an activity of the minimum detectable activity for each of the suspected radionuclides, along with an uncertainty derived from the analytical process, instrument critical level, or other measure of the uncertainty. The on-line WDR will also be annotated to indicate that this waste has no detectable activity and will record the basis for the uncertainty. This means that “less than” values will not be accepted.

Reporting MLLW is required to the Site Treatment Program (STP) for the State of New Mexico Environment Department’s (NMED)’s, Hazardous Waste Bureau. The reporting applies to mixed waste stored for one year past the start accumulation date. The STP is intended to allow storage of accumulated mixed waste for more than one year (which is otherwise prohibited by the Land Disposal Requirements provision of RCRA) while identifying treatment and disposal options while working off inventory.

### *7.2.7 Chemical Characterization*

Chemical constituents and characteristics must be identified and quantified using analytical methods; documented acceptable knowledge is acceptable only as identified for each specific waste stream type. See below for specific requirements for certain waste streams. Hazardous waste characteristics, along with hazardous waste constituents and their concentrations in MLLW, must be specifically identified and documented. The WSP must be completed to document the chemical characterization and hazardous waste characteristics and constituents. Analytical results must have detection limits less than regulatory limits. Because the ultimate destination for most MLLW is Utah, a Utah-certified laboratory must be used for all chemical analysis.

### *7.2.8 Physical Characteristics*

The physical characteristics must be documented on the WSP.

### *7.2.9 Generating Process*

The waste-generating process must be described on the WSP. If necessary, provide additional text on the WSP to thoroughly describe the process.

### *7.2.10 Debris Waste and Radioactive Lead Solids*

Mixed waste meeting the RCRA definition of “debris” (see 40 CFR 268.2, *Land Disposal Restrictions, Definitions Applicable in this Part*) and radioactive lead solids that are unsuitable for recycling are presently disposed of at Energy Solutions of Utah. Sampling and analysis must be performed in accordance with Environmental Protection Agency (EPA) document SW-846. Gamma spectroscopy is mandatory, and isotopic analysis is required as necessary. Additional analysis of hazardous constituents may be required, and the analyses must be done by a Utah-certified laboratory. Energy Solutions’ analytical uncertainty limits for SNM must be met. Contact WPS-HMLW for guidance.

The description on the WSP and the on-line WDR, found in WCATS, must explicitly describe the physical form (e.g., lead bricks, lead wool). Lead-contaminated debris must be segregated from lead metal waste. The term “lead shielding” is not an acceptable description of the lead waste.

Radioactive sources must be removed from lead pigs unless the source itself is the waste material and the lead pig is shielding for radiation protection purposes. In this case, the WSP and on-line WDR must clearly indicate that the waste is the radioactive source and the lead pig is for the purpose of shielding.

Other contaminated metals are possible candidates for recycling and may require segregation. Contact WPS-HMLW for further information.

### *7.2.11 No-Owner Waste*

Waste with no identifiable owner must be fully characterized as described above. Gross alpha, beta, and gamma measurements are not acceptable for radiological characterization. These types of measurements may be acceptable as part of documented acceptable knowledge. Contact WPS-HMLW for additional information. Chemical characteristics must be determined by either analytical measurements or documented acceptable knowledge for selected small-volume (less than 1 qt) waste streams such as lab packs (for example, Material Safety Data Sheet for unused no-owner waste that is still in the container marked by the manufacturer's label). MLLW must be segregated from LLW and nonhazardous waste.

### *7.2.12 Small-Volume Mixed Low-Level Waste (MLLW) and Lab Packs*

For small volumes of MLLW (less than 1 gal.), radioactive and chemical characterization information may be based on documented analytical results or documented acceptable knowledge. In order to minimize costs, the generator should combine small volumes of compatible waste. Lab packs must be packaged in compliance with the requirements in Section 7.3.3. Conservative assumptions are not acceptable for characterization information. One item number must not be used for multiple items. All items within a container must be tracked individually.

### *7.2.13 Soils and Soil-Like Material*

Soils and soil-like material (e.g., soils, ash, dirt, powder, vermiculite) require full physical, chemical, and radiological characterization. Because the waste may be sent to Energy Solutions of Utah, the analyses must be done by a Utah-certified laboratory. Contact WPS-HMLW for guidance. Sampling must be performed in accordance with EPA document SW-846. Physical analyses required include density, material size, color, and moisture content (standard Proctor method American Society for Testing and Materials [ASTM] D-698). Specific chemical analyses required by Energy Solutions of Utah are as follows, with possible exceptions:

- Volatile Organic Compounds (VOCs)
- Semivolatile Organic Compounds (SVOCs)
- RCRA metals
- Soil pH
- Paint filter test
- Reactive cyanide
- Reactive sulfide

Contact WPS–HMLW for more information regarding exceptions.

Radiological parameters include gamma spectral analysis (required) and radiochemistry for non-gamma-emitting nuclides (as necessary).

Soil and soil-like material that is suspected to have only characteristic hazardous properties may not require all of the sampling listed above. Furthermore, it may not require that samples be analyzed by a Utah-certified laboratory. In cases where the generator determines that a waste stream may be only characteristic (D-coded), relaxation of the above listed requirements is possible. Contact WPS-HMLW for guidance, and where applicable, submit a written exception to sampling and analysis requirements.

### *7.2.14 Samples*

Radioactively contaminated liquid and solid samples that are also RCRA hazardous wastes require full physical, chemical and radiological characterization (see Section 7.2.13, *Soils and Soil-Like Materials*) and must be segregated and packaged in accordance with the off-site facility's requirements. Samples with listed RCRA constituents in concentrations above Land Disposal Restriction (LDR) standards must not be commingled, packaged, or in any other manner mixed with other samples. Listed waste meeting LDR requires no further treatment. Listed with constituents above LDR requires treatment to LDR before disposal. Therefore these wastes should be separated and are sent to separate facilities. Samples containing Polychlorinated Biphenyls (PCBs) in any concentration must not be commingled, packaged, or in any other manner mixed with other samples. All samples must be bulked (contents removed from the plastic or glass bottles) into metal drums in accordance with the segregation scheme mentioned above (i.e., RCRA-listed soils above LDR standards, PCB-contaminated soils, and other RCRA soils are all bulked separately). Whenever possible, samples should be returned to the requester of the analysis and ultimately to the original waste material. This is consistent with industry-accepted practices.

### *7.2.15 Printed Circuit Boards and Other Soldered Materials*

***Note:*** Suspect contaminated printed circuit boards may be recycled. Contact WPS-HMLW for guidance.

Radioactively contaminated printed circuit boards, copper and brass fittings, and electronic equipment are typically managed as MLLW because of the heavy metals present in the soldered connections. Printed circuit boards must be packaged in 55-gallon or 30-gallon steel drums without absorbent and should not be commingled with other debris such as lead shielding or other electronic components containing mercury switches. Other types of containers require approval by the WPS-HMLW group leader. The boards must be characterized for radiological contaminants using gamma spectral analysis plus isotopic analysis for non-gamma emitters as necessary.

### *7.2.16 Liquid Wastes with Resource Conservation and Recovery Act (RCRA) Hazardous Constituents, Flammable Liquids, and Other Organic Liquids*

To comply with off-site facility waste acceptance requirements, full chemical, physical, and radiological characterization is required. Chemical analyses generally include:

- VOCs
- SVOCs
- Total metals

- Chlorides
- Fluorides
- Total sulfur
- Ignitability
- pH
- British Thermal Unit (BTU) value
- Water content
- PCBs

Physical parameters generally include specific gravity, viscosity, and total suspended solids. Radiological characterization must include beta and/or gamma emitters greater than 1 pCi/g and alpha emitters greater than 0.1 pCi/g. In general, generators should contact WPS-HMLW to ensure that proposed sampling and analysis regimes will meet the requirements of the off-site facility. WSPs that do not contain the characterization information required by the off-site facility can be categorized as a “No Path” waste.

### *7.2.17 Aqueous Wastes with Heavy Metals*

The aqueous wastes with heavy metals will be treated off-site by stabilization methods. Chemical, physical, and radiological parameters are identical to those presented in Section 7.2.16 of this document.

### *7.2.18 Shreddable Solids Contaminated with Resource Conservation and Recovery Act (RCRA) Hazardous Constituents*

Waste forms in this category include Personal Protective Equipment (PPE) and cellulosic materials contaminated with RCRA constituents. Waste streams that are suspected to be contaminated with F-Listed organic materials will be analyzed for RCRA hazardous constituents by a Utah-certified laboratory. At a minimum, radiological characterization must include both gamma spectroscopic analysis and the appropriate isotopic analyses for the radionuclides believed to be present. PPE and other contact waste can be conservatively characterized based on the analytical results of the waste. It may also be sampled if it is stained or wet. Representative pieces can be cut out for analysis. Alternatively, if the contact waste is not visibly contaminated, it may be demonstrated to be non-hazardous by referencing rad swipes that show no radioactive contamination. Contact WPS-HMLW for guidance.

### *7.2.19 Resource Conservation and Recovery Act (RCRA) Scintillation Cocktails and RCRA Hazardous Liquids*

To package and manage RCRA scintillation cocktails and hazardous liquids contained within vials, place the undrained vials inside a polyethylene drum liner. The drum liner is then packed with vermiculite and placed inside another drum liner that is also packed with vermiculite. Finally, the nested drum liners are packed in a 55-gallon steel open-top drum.

For characterization requirements, see Section 7.2.16, *Liquid Wastes with RCRA Hazardous Constituents, Flammable Liquids, and Other Organic Liquids*. These characterization requirements apply to both bulk fluids and fluids in vials. For fluids in vials, the number of vials to be analyzed depends upon the variability of the materials in the vials. MLLW scintillation cocktails are no longer generated, but may be encountered during legacy cleanup or decontamination and decommissioning operations. The number of vials to be analyzed may depend on the volume of sample required for a specific analysis or analyses under SW-846, *EPA Sampling Requirement for Characterizing Waste*.

### *7.2.20 Mercury Waste*

Mercury mixed waste, including elemental mercury, mercury salts, and mercury-contaminated debris, must be fully characterized. Wastes consisting of radioactively contaminated elemental mercury (e.g., thermostats, thermometers, switches, fluorescent tubes, liquid mercury in glass jars) may be characterized for radiological contaminants only. Gamma spectral analysis combined with isotopic analysis must be performed for suspected non-gamma emitters, such as tritium. Mercury-contaminated debris waste (e.g., floor tile, sink traps, hoses, spent filters, insulation) must be analyzed for total metals, VOCs, SVOCs, and radionuclides, as necessary. Other forms of mercury waste (thiocyanate waste, aqueous mercury, scrap salts) must be analyzed for total metals, VOCs, SVOCs, and radionuclides, as necessary.

For mercury-contaminated oil, see Section 7.2.16, *Liquids Wastes Contaminated with F-listed Solvents, Flammable Liquids, and Other Organic Liquids*, for analytical requirements. Because mercury can corrode steel, all mercury in liquid form must be packaged in a polyethylene container.

## 7.3 Container Requirements

Containers for MLLW must meet DOT requirements for shipment. Pinhole leaks, dents, ill-fitting lids, excessive rust or other signs of damage are not DOT compatible. Acceptable containers are listed in Section 7.3.2. Because most MLLW is eventually shipped off-site, containers for MLLW must not be selected so that road closures will be necessary when shipping the waste to TA-54. Use of non-standard or non-DOT containers must be approved by WPS-HMLW *before* packaging the waste.

The waste should be packaged in the smallest container possible, and the container must be in good condition, without severe rust, dents, deep scratches, bulges, or other structural defects. Defective or deteriorating containers are not acceptable.

The generator must repackage the waste into containers that are not defective or deteriorating.

Mercury in liquid form must be packaged in a polyethylene outer container.

The container must be compatible with the waste it contains and must be closed according to DOT and manufacturer's specifications.

Waste classified as a DOT Class 7 material cannot be packaged using the lab pack exception, 49 CFR 173.12(b), *Exceptions for Shipment of Waste Materials, Lab Packs*. Gas cylinders must also meet specific criteria identified in 49 CFR 178, Subpart C*, Specifications for Cylinders*, to be accepted for transport. The cylinders must not have welded seams, must have the appropriate valves, and must be approved by the DOT for the contained material.

### *7.3.1 Department of Transportation (DOT) Class 7*

Personnel or contractors from WPS-HMLW are not authorized to package DOT Class 7 material at the generator's location. Therefore, if the MLLW is DOT Class 7, the generating organization must either package it in accordance with DOT regulations or arrange for Operations Support–Packaging and Transportation to package the waste.

### *7.3.2 Acceptable Containers*

Non-flammable bulk liquids of greater than 110 gal. destined for Area G may be packaged in polyethylene tanks. The tanks must meet DOT requirements; in addition, the generating organization must provide secondary containment (e.g., integral secondary containment). Non-DOT-compliant tanks may be used only with previous authorization of WPS-HMLW.

Liquid MLLW, including flammable liquids without a significant radioactive component destined for storage at TA-54, Area L, may be packaged in any of the following containers:

- Open-head polyethylene 5-, 14-, and 30-gal. drums.
- Closed-head polyethylene drums with a 55-gal. or smaller capacity.
- Metal 30- and 55-gal. drums.

Non-lab pack liquids should be packaged in closed-head drums for safety reasons during transport and during subsequent storage. Bulk liquids destined for Area L may be packaged in polyethylene tanks that meet DOT requirements. Note that in addition the generating organization must provide secondary containment (e.g., integral secondary containment). Non-DOT-compliant tanks may be used only with previous authorization of WPS-HMLW. Liquid MLLW must be packaged so that the container can be overpacked, if necessary, into a metal drum no larger than 85 gal. This ensures that a routine capability exists for overpacking a container of liquid MLLW during an emergency situation (e.g., a leaking drum).

Each waste container must comply with the following capacity criteria, as they apply:

- If packaged by the generator, MLLW must be packaged into the smallest possible size of acceptable container (Section 7.3) that meets DOT requirements.
- If not packaged by the generator, MLLW must be in a form that can be placed into a 55-gal. or smaller DOT-compliant drum.
- Containers must be selected to minimize void space (including any absorbent) in the container. As appropriate, the generator must consolidate identical wastes to maximize container efficiency.

### *7.3.3 Lab Pack Criteria*

For waste to be considered for lab packing, the criteria in 49 CFR 173.12, *Exceptions for Shipment of Waste Materials* must be met.

The generator must repackage any waste or overpack any waste container that does not meet the applicable acceptance criteria.

### *7.3.4 Items Larger than 55-Gallon Drums*

MLLW items larger than 55-gal. drums (e.g., gloveboxes) are not acceptable for storage at TA-54 unless the waste meets the packaging and physical dimension requirements of the off-site facility. For example, lead-lined gloveboxes must be processed so that they meet the WAC of the off-site destination facility. Generators of nonstandard-sized items should contact WPS-HMLW group on a case-by-case basis for guidance on acceptable packaging and possible waste reconfiguration, such as decontamination or lead removal.

Decontamination and recycling or removal of the lead lining is a preferred approach to handling items such as lead-lined gloveboxes. The radioactively contaminated portions of the glovebox that are not RCRA hazardous waste and that are not recyclable can be disposed of as LLW. Assistance with removal of lead lining is available. Contact WPS-HMLW for further information.

#### *7.3.5 Headspace in Containers with Liquid*

According to 49 CFR 173.24, *General Requirements For Packagings and Packages*, (h), sufficient ullage (outage or headspace) must be left when filling receptacles with liquids. Liquids may expand because of temperature changes during transportation. Headspace must be sufficient to prevent leakage or permanent distortion of the packaging or receptacle resulting from this expansion. Liquids must not completely fill a receptacle at a temperature of 131ºF or less (49 CFR 173.24a[d]). Containers must not be filled with liquids to more than 85% of their rated capacity. For example, WPS-HMLW has determined that a 6-in. headspace should be left in a 55-gal. drum.

### 7.4 Package Weight

The maximum net acceptable weight for any size drum of waste is 400 kg (882 lb) or the rated capacity of the container based on DOT-specified package certification tests for the contained material, whichever is less. The maximum acceptable gross weight for lab-packed waste is 204 kg (450 lb) or the rated capacity of the container, whichever is less. It is the generator's responsibility to document container tare weights and net waste weights accurately. A discrepancy of ±15% of the container weight is not acceptable and the container may be returned. To avoid problems associated with movement of heavy drums, the drum size should be selected and the drum filled so that the gross weight is less than 600 lb. For other containers such as ST90s, the maximum acceptable weight is the rated capacity, which should be stamped on the surface of the container. If in doubt, contact the manufacturer.

### 7.5 External Package Contamination and Dose Rate

Removable and fixed-surface radiological contamination may not exceed the limits established in Chapter 14, *Contamination Control*, of P121, *Radiation Protection*. The external dose rate of a package containing MLLW may not exceed 200 mrem/h on contact, or 10 mrem/h at 1 m (3.3 ft) from the surface of the package. The generator must notify the waste management facility in advance if the package dose rate exceeds 100 mrem/h on contact, or 5 mrem/h at 30 cm (12 in.) from the surface. Packages having a surface dose rate greater than 10 mrem/h must be highlighted on the shipping paper. Packages must not have any external chemical contamination. Contaminated packages must be overpacked.

### 7.6 Package Marking and Labeling

MLLW packages must be marked and labeled according to DOT requirements for the contained waste. Additionally, containers of MLLW must also have the following:

- A completed hazardous waste marking,
- A completed Health Physics Radioactive Material Tag or equivalent,
- A barcode marking,
- The up arrows marking, and
- "CAUTION – RADIOACTIVE WASTE" tape or marking.

The hazardous waste marking must contain the following:

- The generator's name and address,
- The manifest document number,
- The accumulation start date, and
- The DOT proper shipping name and identification number.

The proper shipping name must include technical names, if applicable.

The Health Physics Radioactive Material Survey Tag or equivalent (e.g., multiple survey label or sticker) must contain the external dose rate on contact with and at 1 m from the package and is recommended to contain the dose rate at 30 cm (12 in.) from the surface. The maximum external dose rate should be recorded. Contamination smear results must be recorded. The tag or equivalent must be completed, signed, and dated by a Radiological Control Technician (RCT) in accordance with P121, *Radiation Protection*.

### 7.7 Additional Requirements

MLLW with a significant radioactive component may have characteristics not previously analyzed in the Safety Analysis Report for Area G. In this case, an Unreviewed Safety Question Determination (USQD) must be prepared. If the USQD is positive, then a safety analysis must be prepared. These efforts require greater than 90 days to complete; therefore, the generator of MLLW with a significant radioactive component must be aware that this MLLW may require an extended time period before acceptance of this waste for storage at TA-54. The responsibility for storing MLLW with a significant radioactive component in accordance with RCRA (e.g., extending the 90-day storage limit) before acceptance at TA-54 resides with the generator. The generator has to notify ENV-RCRA by day 70 if they know they will exceed the 90-day storage limit. The extension must contain the following information: justification of why the extension is required, what has been done to date to move the waste, and a written action plan that ensures that the waste will be moved before the 30-day extension ends. The generator of MLLW with a significant radioactive component should contact WPS-HMLW before the generation of this MLLW to ensure that long-term storage capability is available for this MLLW.

***Note:*** Flammable liquids with a significant radioactive component are not acceptable for storage at TA-54.

Generators sending MLLW to TA-54 that violates any of the requirements in this attachment will be issued a nonconformance report in accordance with Waste Management-Waste Management Programs (WM-PROG) processes.

### 7.8 Time Limits on Mixed Low-Level Waste (MLLW)

- For MLLW stored in a less-than-90-day storage area, the on-line WDR, found in WCATS, for the waste must be submitted on or before day 45.

For MLLW stored at a Treatment, Storage, and/or Disposal Facility (TSDF), the on-line WDR for the waste must be submitted at least six months before exceeding the one-year MLLW storage requirement. In addition, the waste must be inventoried and the on-line WDR tracked so that the waste is received at TA-54 no later than five months before exceeding the one-year limit from the accumulation start date.

This ensures sufficient time for reviews of Material-at-Risk (MAR) limits, quality assurance, and consolidation of shipments for economies of scale. Generators should notify their Waste Management Coordinator (WMC) immediately when an item is declared waste. It is the responsibility of the generator to get the assistance needed to ensure that these limits are not exceeded.

### 7.9 Recharge and Costs

With the initiation of the recharge system, all costs of the management, shipping, treatment, and disposal of MLLW will be charged to the generating organization, using the cost codes attached to the waste. Additional costs incurred for exceptional or nonconforming waste are also the responsibility of the generating organization until the waste is accepted off-site for treatment and disposal. For waste recharge rates, contact WPS-HMLW.

MLLW and LLW destined for off-site treatment will be based on three broad categories, as follows:

- Bulk waste for straight disposal (e.g., F-listed soils meeting LDR)
- Bulk wastes for basic treatment (e.g., RCRA debris for macroencapsulation, liquids for incineration, soils for stabilization)
- Chemical waste (e.g., lab packs, elemental mercury, reactives)

The recharge costs reflect the actual costs from the off-site TSDFs, and are based on the net volume of the waste. Reactive waste shipped in a 5-gal. bucket has cost as much as $15,000 at a commercial TSDF. The bucket may also have a minimum charge of several thousand dollars. Therefore, significant cost savings are possible by consolidating similar wastes. Every effort should be made to fill each container with similar items.

### 7.10 No-Disposal Path Waste

All MLL Waste Profiles and on-line WDR, found in WCATS, are reviewed for disposal options. If waste is determined to have no reasonable disposal option (i.e., “No-Path” waste), the generator and WMC will be notified by the Waste Disposition Project (WDP) and must follow the guidance in P409, *Waste Management*.

Once the paperwork is complete, the waste can be received at TA-54 for storage until a disposal option is available. At that time, the charge codes from the on-line WDR will be used to pay for the shipping, treatment, and disposal. There is currently a nominal annual storage fee to ensure the codes are active.

Disposal options have been developed for most MLLW, including all forms of mercury. No-disposal-path waste items include radioactive dioxins, explosives, highly radioactive items, and other items that do not meet the TSDF WAC. Certain MLLW items, such as externally contaminated aerosol cans and gas cylinders, are prohibitively expensive to treat. Unless there is evidence of internal radioactivity, the generator must have these swiped and released as hazardous waste. While a disposal path has been developed for internally contaminated gas cylinders, there may be a surcharge in addition to the recharge.

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**Attachment 8. Other Low-Level Waste (LLW) (Page 1 of 2)**

Non-Environmental Protection-Resource Conservation and Recovery Act (RCRA) Low-Level Waste (LLW) not acceptable for disposal at Technical Area (TA)-54, Area G, or for treatment at the Radioactive Liquid Waste Treatment Facility (RLWTF) will be accepted for storage on a case-by-case basis.

Conditions for acceptance of these types of wastes are defined in this attachment.

To the extent possible, liquids should be absorbed or solidified by the generator to make the waste acceptable for burial. Contact the Waste Disposition Project (WDP) to initiate this acceptance process. Low-level radioactive liquids may be sent off-site for incineration, but the generating organization will be billed the recharge rate comparable to the rate for Mixed Low-Level Waste (MLLW).

Reporting MLLW is required to the Site Treatment Program (STP) for the State of New Mexico Environment Department (NMED)'s, Hazardous Waste Bureau. The reporting applies to mixed waste stored for one year past the start accumulation date. The STP is intended to allow storage of accumulated mixed waste for more than one year (which is otherwise prohibited by the Land Disposal Requirements provision of RCRA) while identifying treatment and disposal options while working off inventory.

## 8.1 Waste Form

The waste must meet the requirements of Section 7.1 of Attachment 7, *Mixed Low-Level Waste (MLLW)*.

## 8.2 Package Contents

Liquids and solids must be segregated and packaged separately. In addition, other LLW must be segregated from RCRA-regulated waste. The waste must meet the requirements of Section 7.2.

## 8.3 Container Requirements

Waste containers must meet the requirements of Section 7.3 of Attachment 7, *Mixed Low-Level Waste (MLLW)*.

## 8.4 Package Weight

The gross package weight must meet the requirements of Section 7.4 of Attachment 7, *Mixed Low-Level Waste (MLLW)*.

## 8.5 External Package Contamination and Dose Rate

The external package contamination and dose rates must meet the requirements of Section 7.5 of Attachment 7, *Mixed Low-Level Waste (MLLW)*.

## 8.6 Non-Resource Conservation and Recovery Act (RCRA) Scintillation Vials and Nonhazardous Combustible Liquids

Nonhazardous combustible liquids must be bulked, as necessary, by the generator. Scintillation fluid cocktails and combustible liquids that are not RCRA hazardous wastes must be absorbed or solidified and disposed of as LLW (see Attachment 3, *Solid Low-Level Waste (LLW)*). Bulk fluids that are not RCRA hazardous wastes must be packaged in United Nations (UN)-rated containers in accordance with the requirements of 49 CFR, *Transportation*.

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**Attachment 8. Other Low-Level Waste (LLW) (Cont.) (Page 2 of 2)**

### 8.7 Package Marking and Labeling

The waste package must be marked and labeled in accordance with the requirements of Section 7.6.

### 8.8 Scrap Metal for Recycle

Lead and steel with radioactive contamination should be assessed for possible recycle, which is allowable within the Department of Energy (DOE) complex. The material can be profiled as MLLW or as non-mixed, Low-level scrap metal for recycle, and can be shipped directly off-site after completion of the Waste Stream Profile (WSP) and on-line Waste Disposition Request (WDR), which is found in the Waste Compliance and Tracking System (WCATS). Contact Waste Projects and Services–Waste Acceptance for guidance.

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**Attachment 9. Asbestos Waste (Page 1 of 3)**

Asbestos is a generic term that describes naturally occurring crystalline minerals and encompasses the following six minerals: chrysotile, amosite, crocidolite, tremolite, actinolite, and anthophyllite. Friable asbestos is any asbestos material applied to ceilings, walls, structural members, piping, ductwork, or any other part of the building structure that, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure (40 CFR 763.83, *Definitions*. Nonfriable asbestos is that which is completely encapsulated in a manufactured article such as a safe or file cabinet. Identify asbestos as a New Mexico special waste.

***Note:*** For asbestos waste streams that are also hazardous and/or radioactive, other attachments of this document also apply. For additional guidance refer to the tools found in P409, *Waste Management*.

## 9.1 Nonradioactive Asbestos Waste

Nonradioactive asbestos waste is stored at Technical Area (TA)-54, until shipped off-site for disposal. The Laboratory's asbestos abatement personnel perform the abatement and packaging operations.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures, and the Waste Acceptance Criteria regarding allowable radiological levels of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

### *9.1.1 Waste Form*

Friable asbestos must be wetted down sufficiently to prevent fiber release. There are no special requirements for nonfriable asbestos.

### *9.1.2 Package Contents*

There are no restrictions on the contents of the waste packages. Both friable and nonfriable asbestos are accepted for storage at TA-54. However, friable asbestos and nonfriable asbestos must not be placed in the same container.

### *9.1.3 Container Requirements*

Friable asbestos must be packaged in accordance with 49 CFR 173, *Shippers—General Requirements for Shipments and Packagings*. Friable asbestos must be packaged in double plastic bags with a minimum thickness of 6 mil. The bags must be sealed in such a way as to be leak proof; the amount of void space or air in the bags must be minimized. Asbestos waste slurries must be packaged in leak-proof drums if they are too heavy for the bags. Cardboard, poly, or metal containers lined with 6-mil plastic may also be used to package asbestos, provided the sealed container is leak proof. Large items, such as piping removed from a facility without first removing the asbestos, must be double-wrapped in plastic with a minimum thickness of 6 mil and sufficient to create a leak-proof container.

Nonfriable asbestos does not require any special packaging unless the integrity of the article containing the asbestos is in any way impaired, in which case the article must be packaged as friable asbestos.

#### *9.1.4 Package Weight*

Package weight limitations are based on the strength and capacity of the containers in which the asbestos is packaged. Containers must be capable of holding the asbestos waste during moving, lifting, and transporting. Package weight must not exceed the rated capacity of the container based on United Nations (UN)-specified package certification tests for the contained material.

#### *9.1.5 External Package Contamination*

The exterior of the packages of asbestos waste must be free of asbestos debris. Contaminated packages must be overpacked.

#### *9.1.6 Package Marking and Labeling*

Each container of friable asbestos waste must be marked with the warnings shown in Fig. 9-1.

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

PELIGRO
CONTIENE FIBRAS DE ASBESTO
EVITAR LA FORMACION DE
POLVO - PELIGRO DE ENFERMEDAD
DE LOS PULMONES Y CANCER

**Fig. 9-1. Warning labels for friable asbestos containers.**

All regulated asbestos containers, including individually wrapped facility components or pipes, must have a warning label specified by the United States (US). Environmental Protection Agency (EPA) or the Occupational Safety and Health Administration. Labels must be printed in both English and Spanish in accordance with NMAC 20.9.8.12 F, *Asbestos Waste*. Containers must be marked with the Environmental Protection-Water Quality and RCRA (ENV-RCRA) special waste label. Contact geri@lanl.gov for the label.

### 9.2 Radioactive Asbestos Waste

The following sections apply only to radioactive asbestos waste that is destined for disposal at TA-54, Area G,

#### *9.2.1 Waste Form*

Radioactive friable asbestos must be wetted down sufficiently to prevent fiber release. Asbestos waste must also comply with the requirements listed in Section 3.1 of Attachment 3, *Solid Low-Level Waste (LLW)*.

#### *9.2.2 Package Contents*

The package contents must comply with the requirements listed in Section 3.2 of Attachment 3, *Solid Low-Level Waste (LLW)*.

Nonfriable asbestos does not require any special packaging unless the integrity of the article containing the asbestos is impaired. If such is the case, the article must be packaged as friable asbestos. Friable asbestos must be segregated from nonfriable asbestos to the extent possible.

### *9.2.3 Container Requirements*

Containers used for asbestos must meet the container requirements of Section 3.3 of Attachment 3, *Solid Low-Level Waste (LLW)*.

Friable asbestos must be packaged in plastic-lined metal containers. The bags must be sealed in such a way as to be leak-proof. Large items (such as piping) removed from a facility without first removing the asbestos must be double-wrapped in plastic with a minimum thickness of 6 mil and sufficient to create a leak-proof container.

Nonfriable asbestos does not require any special packaging unless the integrity of the article containing the asbestos is impaired. If such is the case, the article must be packaged as friable asbestos. Friable asbestos must be segregated from nonfriable asbestos to the extent possible.

### *9.2.4 Package Weight*

Package weight limitations are based on the strength and capacity of the containers in which the asbestos is packaged. The containers must be capable of holding the asbestos waste during moving, lifting, and transporting. Package weight must not exceed the rated capacity of the container based on Department of Transportation (DOT)-specified package certification tests for the contained material.

### *9.2.5 External Package Contamination*

Removable surface radiological contamination must not exceed the limits established in P121, *Radiation Protection*. The package must be free of external asbestos contamination. Packages externally contaminated with asbestos must be overpacked.

### *9.2.6 Package Marking and Labeling*

Each container must be labeled and marked according to DOT regulations for the radiological properties of the waste (if applicable) and marked with the warnings described and depicted in Section 9.1.6.

### *9.2.7 Additional Requirements*

Radioactively contaminated asbestos waste must also meet the requirements of Section 3.7 of Attachment 3, *Solid Low-Level Waste (LLW)*.

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**Attachment 10. Infectious/Medical/Biological Waste (Page 1 of 5)**

For the purpose of these Waste Acceptance Criteria (WAC), the definitions and acceptance criteria for infectious waste, infectious substances, and regulated medical waste are based on the New Mexico Solid Waste Management Regulation (SWMR-4) and the Department of Transportation (DOT) definitions and requirements for these materials. Infectious waste includes all materials defined as infectious substances or regulated medical waste. An infectious substance (etiological agent) is a viable microorganism, or its toxin, that causes or may cause disease in humans or animals, and includes those agents listed in CDC Office of Health and Safety of the regulations of the United States (US) Department of Health and Human Services and any other agent that causes or may cause severe, disabling, or fatal disease (49 CFR 173.134, *Shippers—General Requirements for Shipments and Packagings—Definitions and exceptions* [a][1]). Regulated medical waste is a waste or reusable material, other than a culture or stock of an infectious substance, that contains an infectious substance and is generated in (1) The diagnosis, treatment, or immunization of human beings or animals; (2) research pertaining to the diagnosis, treatment, or immunization of human beings or animals; or (3) the production or testing of biological products (49 CFR 173.134[a][4]). Clean-up debris from accidents involving blood or human waste would also be considered as regulated medical waste. Infectious or regulated medical nonhazardous and nonradioactive wastes are identified as New Mexico Special Waste.

Biological waste consists of any animal material that does not meet the definition of regulated medical waste, infectious waste, or infectious substance.

Material that has been rendered noninfectious may be managed as nonhazardous noninfectious waste, provided it is not otherwise regulated, hazardous, special, or radioactive waste. The sterilization process used to render the material noninfectious must comply with NMAC 20.9.8.13.B, *Infectious Waste*. The method of sterilization must be added to the Waste Disposition Request (WDR), found in WCATS.

## 10.1 Nonradioactive Infectious and/or Medical Waste

New Mexico special waste may only be transported by haulers registered with the New Mexico Environment Department (NMED). This includes the transport of special waste within the boundaries of LANL (i.e., from one LANL Technical Area [TA] to another).

Nonradioactive infectious wastes are packaged compliantly by the waste generator and/or the Waste Management Coordinator (WMC) and transported off-site by a LANL-approved commercial waste transporter. The commercial waste transporter does not enter TA-54. The WAC established in the following sections comply with and are based on SWMR-4, US Department of Health and Human Services, and DOT regulations.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures and the Waste Acceptance Criteria regarding allowable radiological levels, of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

### *10.1.1 Waste Form*

Biological tissue, including animal carcasses, must be frozen at the time of waste pickup. Other than by the generator, infectious waste may not be stored for more than seven days without refrigeration at or below 45 degrees Fahrenheit.

### *10.1.2 Package Contents*

If the infectious substance is contained in individual, sealed containers, each container must be wrapped to prevent contact with other containers, placed in a red plastic bag with enough absorbent material to absorb the entire contents of the containers, and placed in a rigid outer container.

All other infectious substances must be double-bagged in red plastic bags, with at least 1 $cm^3$ of absorbent material or enough absorbent material placed in the outer bag to absorb the entire contents of the inner bag, and placed in a rigid outer container. An itemized list of the contents must be enclosed in a water-resistant envelope between the secondary plastic bag and the outer container.

Based on the regulations established by the US Department of Health and Human Services in 49 CFR, *Transportation,* Parts 171–178, if the volume of the infectious substance within the inner plastic bag exceeds 50 mL (1.7 oz), a shock-absorbent material of a volume at least equal to that of the absorbent material between the primary and secondary containers must be placed at the top, bottom, and sides between the secondary container and the outer shipping container. Single primary containers may not contain more than 1,000 mL (33.8 oz) of material. Two or more primary containers whose combined volumes do not exceed 1,000 mL (33.8 oz) may be placed in a single secondary container. The amount of an infectious substance that may be enclosed within a single outer shipping container may not exceed 4,000 mL (135 oz).

### *10.1.3 Container Requirements*

Infectious substances must be packaged in double 3-mil red plastic bags inside a rigid container. The bags and the outer container must be sealed to be watertight, leak proof, and to prevent release of material during handling and transport. The rigid outer container used to package any infectious waste must be of adequate size and mass, appropriate for its intended use, and must be capable of passing the test specified by the DOT in 49 CFR 178.609, *Test Requirements for Packaging for Infectious Substances*. These criteria meet both New Mexico Environmental Protection/Solid Waste/Special Waste Requirements (NMAC 20.9.8.13), and DOT regulations (49 CFR 173.196, *Category A Infectious Substances*).

Liquid, regulated medical waste must be packaged according to the requirements of 49 CFR 173.201, *Non-Bulk Packagings for Liquid Hazardous Materials in Packing Group I*. Solid regulated medical waste must be packaged according to the requirements of 49 CFR 173.212, *Non-Bulk Packagings for Solid Hazardous Materials in Packing Group II*. The packaging must meet specific criteria established in 49 CFR 173.197, *Regulated Medical Waste*. The package must be

- Rigid,
- Leak resistant,
- Impervious to moisture,
- Sufficiently strong to prevent tearing or bursting under normal conditions of use and handling,
- Sealed to prevent leakage during transport,
- Puncture-resistant for sharps and sharps with residual fluids, and
- Break resistant and tightly lidded or stoppered, for fluids in quantities greater than 20 cc (0.7 oz).

Sharps must be packaged in leak-proof, rigid, puncture-resistant containers manufactured specifically for containing sharps. These containers must be taped closed or tightly lidded and placed within a red plastic bag and a rigid outer container.

### *10.1.4 Package Weight*

Package weight must not exceed the rated capacity of the container based on United Nations (UN)-specified package certification tests for the contained material.

### *10.1.5 External Package Contamination*

There must be no external contamination on the packages of waste. Contaminated packages must be overpacked.

### *10.1.6 Package Marking and Labeling*

The red plastic bags must be labeled with the universal biohazard symbol and the word "BIOHAZARD." The external rigid containers holding infectious waste must be labeled with the DOT-specified infectious substance label (designated in 49 CFR 172.432, *Infectious Substance Label),* the biohazard symbol, and the word "BIOHAZARD." The container must also be marked with the DOT proper shipping names, identification number, and the technical name of the infectious substance. Regulated medical waste does not require the technical name.

External rigid containers holding infectious substances must also bear the etiological agent label described and illustrated in 49 CFR 172.323, *Infectious Substances*.

The outer container must be clearly marked with Environmental Protection-Water Quality and RCRA (ENV-RCRA) New Mexico Special Waste marking with the following information:

- Generator name
- Group
- Location (TA, Building, and Room)
- Telephone number

Contact geri@lanl.gov for the label.

If required by DOT, the outer container must bear the infectious substance label.

If the package contains a liquid, orientation arrows indicating which side of the package must be kept facing upwards must be marked on the outer container.

### *10.1.7 Additional Requirements and/or Restrictions*

Infectious substances that are also regulated by Resource Conservation and Recovery Act (RCRA) as hazardous wastes must be packaged, labeled, marked, and transported according to the regulations for infectious substances. However, the waste itself must be managed as a hazardous waste in that all Treatment, Storage, and/or Disposal (TSD) processes must comply with the RCRA regulations for hazardous wastes.

Medical waste that is also a RCRA-regulated hazardous waste must be packaged, labeled, marked, transported, stored, treated, and/or disposed of according to the RCRA regulations for the hazardous characteristic or constituent contained in the waste.

All infectious and/or medical on-line WDRs must be submitted at least 45 days before exceeding the storage limitation.

## 10.2 Radioactive, Medical, and/or Biological Waste

Radioactively contaminated medical and biological waste may be disposed of at TA-54, Area G, provided it complies with the criteria listed in Sections 10.2.1 through 10.2.6 of this document. Radioactively contaminated regulated medical waste, biological waste containing a hazardous constituent, and infectious substances are managed on a case-by-case basis.

### *10.2.1 Waste Form*

To be acceptable for disposal at TA-54, Area G, regulated medical waste must

- Conform to the requirements of Section 3.4 of Attachment 3, *Solid Low-Level Waste (LLW)*,
- Be frozen,
- Be certified as a non-biohazard, and
- Be packaged in slaked lime if containing animal tissue.

Biological waste must meet the requirements of Section 3.1 of Attachment 3, *Solid Low-Level Waste (LLW)*.

### *10.2.2 Package Contents*

Packages of radioactively contaminated medical and biological waste must conform to the requirements of Section 3.2 of Attachment 3, *Solid Low-Level Waste (LLW)* and the DOT requirements described in Section 10.1.3.

### *10.2.3 Container Requirements*

Radiological medical waste must be bagged in double red plastic bags and placed in a leak-proof outer container. This waste must also be packaged according to the DOT container requirements described in Section 10.1.3 for medical waste. Containers of radiological biological waste must meet the requirements of Section 3.3 of Attachment 3, *Solid Low-Level Waste (LLW)*.

### *10.2.4 Package Weight*

Package weight must not exceed the rated capacity of the container based on UN-specified package certification tests for the contained material.

### *10.2.5 External Package Contamination*

Removable surface radiological contamination must not exceed the limits established in P121, *Radiation Protection*. There must be no external contamination of infectious material on the exterior surfaces of the packages of waste.

### *10.2.6 Package Marking and Labeling*

Packages must be marked and labeled according to Section 10.1.6 and Section 3.6 of Attachment 3, *Solid Low-Level Waste (LLW)*.

### *10.2.7 Additional Requirements*

Radioactively contaminated medical and/or biological waste must also meet the requirements of Section 3.7 of Attachment 3, *Solid Low-Level Waste (LLW)*.

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**Attachment 11. Polychlorinated Biphenyl (PCB) Waste (Page 1 of 5)**

Polychlorinated Biphenyls (PCBs), a family of over 200 variously chlorinated biphenyl isomers, can vary in form from oily liquids to white crystalline solids or black, tar-like resins. Many electrical devices contain PCBs for their dielectric or insulating properties.

The Toxic Substance Control Act (TSCA) regulates in-use and waste materials containing PCB concentrations equal to or greater than 50 ppm. For the purposes of this document, the term PCB waste refers to waste from a source containing 50 ppm or more PCBs. Also, waste that was diluted to less than 50 ppm PCBs must still be managed as waste having PCBs equal to or greater than 50 ppm. However, it should be noted that some LANL waste treatment facilities, such as the Sanitary Wastewater System (SWWS) Plant and the Radioactive Liquid Waste Treatment Facility (RLWTF), will not accept wastes with any detectable PCBs.

PCB waste can include, but is not limited to, voltage regulators, vacuum pumps, oils, fluorescent light ballasts, spill cleanup debris, hydraulic systems, capacitors, transformers, old electrical wiring insulation, rags, and protective equipment. The generator should contact the PCB Management Program at (505) 667-4715 to determine the classification of PCB waste based on PCB concentration.

For waste streams that are TSCA regulated for PCBs, and are also Resource Conservation and Recovery Act (RCRA)-hazardous and/or radioactive, other Attachments of this document apply.

## 11.1 Nonradioactive Polychlorinated Biphenyl (PCB) Waste

Nonradioactive PCB waste is stored at Technical Area (TA)-54 until it can be shipped to an off-site disposal facility. Nonradioactive PCB waste must be disposed of within one year of the date of waste generation.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures and the Waste Acceptance Criteria regarding allowable radiological levels, of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

### *11.1.1 Waste Form*

Equipment that contains or has contained PCBs is regulated, and therefore managed, as though it contains PCBs at the original concentration. Pumps, lathes, and other equipment (except capacitors) must be drained of all fluids. Generators should contact the Laboratory's services contractor to drain the equipment. The PCB Management Program (dyea@lanl.gov) should be notified of any PCB item that is removed for disposal.

Liquid PCB waste with greater than or equal to 50 ppm PCBs cannot be solidified for disposal.

Contact jpo@lanl.gov before draining transformers with PCB concentrations of 50 ppm or greater.

### *11.1.2 Package Contents*

The concentration of PCBs in the waste must be identified and documented on the on-line Waste Disposition Request (WDR), found in WCATS. The concentration is determined either by analysis (for oils) or by identification number (for capacitors). For items at 500 ppm or greater, the article or equipment from which PCB oil is drained retains the PCB concentration of the oil.

If the PCB waste contains a hazardous constituent, the constituent and its concentration must also be identified and documented.

### *11.1.3 Container Requirements*

Nonradioactive PCB waste must be packaged according to the requirements in P409, *Waste Management*. Solid PCB waste, such as contaminated debris, capacitors, and other PCB articles or equipment, must be packaged according to Department of Transportation (DOT) regulations. Drums containing leaking PCB equipment must contain sufficient absorbent material to absorb the contents of the equipment. The presence of leaking PCB equipment must be documented on the on-line WDR, found in WCATS. Liquid PCB waste, such as oil drained from transformers, must be packaged in accordance with DOT regulations.

The packaging requirements for a transformer containing PCBs depend on the size, type, and contents of the transformer. The generator should contact Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW) for assistance in packaging and handling transformers.

The containers must be in good condition, without severe rust, dents, deep scratches, bulges, or other structural defects. The container must be compatible with the waste it contains. If the PCB waste contains a RCRA-regulated hazardous constituent, the container must also be appropriate for the RCRA-regulated hazardous constituent.

### *11.1.4 Headspace in Containers with Liquid*

According to 49 CFR 173.24, *General Requirements For Packagings and Packages*, (h), sufficient ullage (outage or headspace) must be left when filling receptacles with liquids. Liquids may expand because of temperature changes during transportation. Headspace must be sufficient to eliminate leakage or permanent distortion of the packaging or receptacle resulting from this expansion. Liquids must not completely fill a receptacle at a temperature of 131ºF or less (49 CFR 173.24a[d]). Containers must not be filled with liquids to more than 85% of their rated capacity. For example, WPS-HMLW has determined that a 6-in. headspace should be left in a 55-gal. drum.

### *11.1.5 Package Weight*

The maximum acceptable net weight for bulk (55-gal.) PCB waste is the rated capacity of the container based on United Nations (UN)-specified package certification tests for the contained material.

### *11.1.6 External Package Contamination*

There must be no PCB contamination on the exterior of the package. Contaminated packages must be overpacked in either 55-gal. or 85-gal. overpack containers.

### *11.1.7 Package Marking and Labeling*

Except for small (less than 1.4 kg [3 lb] dielectric fluid) PCB capacitors and light ballasts, each PCB item placed inside a container must have a PCB marking and a PCB identification number assigned by the PCB Management Program. Containers of waste having less than 50 ppm PCBs must have the blue and white label certifying that the fluid in or drained from the equipment or article is not classified as a PCB waste. Note that this classification does not mean that the level of PCBs in the waste is below detection; detectable PCBs disqualify any waste material for treatment at SWWS or the RLWTF. Containers of waste having from 50 ppm or more PCBs must have the label stating “Caution—Contains PCBs. The label is yellow and black with a black border and measures 15.24 cm (6 in.) square (Laboratory Stock No. CM 3842). Contact the PCB Management Program, dyea@lanl.gov for PCB labels.

The outer container must also be marked with the date the waste was taken out of service and into storage, a PCB identification number, if applicable, obtained from the PCB Management Program, and a non-RCRA marking as provided by the pickup crew. PCB waste containing a RCRA-regulated hazardous component must be marked and labeled according to the requirements for that component (e.g., the hazardous waste marking and the DOT-required label). All labels and markings must be placed on the outer container so that they are readily visible to an inspector. Contact the PCB Management Program, dyea@lanl.gov for PCB labels.

#### *11.1.8 Additional Requirements*

The PCB identification number of the container and the individual PCB items and the out-of-service date must be included on the on-line WDR.

If PCB waste is coming from a temporary PCB storage area, (<30 days), the disposal request must be submitted 20 days before exceeding the storage limitation.

If PCB waste is coming from a general PCB storage area, (<90 days), the disposal request must be submitted 45 days before exceeding the storage limitation.

If PCB waste is coming from a long-term PCB storage area, (<one year), the disposal request must be submitted six months before exceeding the storage limitation.

### 11.2 Radioactive Polychlorinated Biphenyl (PCB) Waste

Radioactive PCB waste is stored at TA-54 until it can be shipped to an off-site disposal facility. Radioactive PCB waste having treatment/disposal options must be disposed within one year of the date of waste generation. Radioactive PCB waste with no disposal path forward may be stored for more than one year provided a written record documenting all continuing attempts to secure that disposal is maintained until the waste is disposed of.

#### *11.2.1 Liquid*

Liquid radioactive PCB waste with greater than or equal to 50 ppm PCBs cannot be solidified for disposal.

Generators of liquid radioactive PCB waste must subject their waste to the chemical analyses for the following:

- Volatile Organic Compounds (VOCs)
- Semivolatile Organic Compounds (SVOCs)
- total metals
- chlorides
- fluorides
- total sulfur
- total phosphorous
- reactive cyanide
- reactive sulfide
- ash content

- British Thermal Unit (BTU) content
- ignitability
- pH
- corrosivity
- water content

The following physical parameters are required:

- total suspended solids
- specific gravity
- viscosity
- boiling point
- freezing point

Each waste stream must be analyzed for all radionuclides considered to be potentially present based on the waste generator's process knowledge. Packaging requirements are presented in Section 11.1.1 through Section 11.1.6 of this document.

PCB waste that is also a Mixed Low-Level Waste (MLLW) may be acceptable for treatment. The analytical and packaging requirements for PCB waste with RCRA components are identical to the requirements presented in this section for liquid radioactive PCB waste. In addition, liquid radioactive PCB waste must meet the characterization requirements for MLLW, as given in Section 7.2. Liquid radioactive waste with any detectable PCBs cannot be treated at the RLWTF.

### *11.2.2 Solid Polychlorinated Biphenyl (PCB) Waste*

Solid, radioactive PCB waste is disposed off-site. In addition to meeting the definition of a Low-Level Waste (LLW), the waste must meet the criteria below.

#### *11.2.2.a Waste Form*

The waste must conform to the criteria listed in Section 3.1 of Attachment 3, *Solid Low-Level Waste (LLW)*. PCB waste must be stabilized in accordance with 40 CFR 761.75, *Chemical Waste Landfills*, (b)(8)(ii).

#### *11.2.2.b Package Contents*

The package contents must be identified as to the PCB concentration and type of radioactive contamination, and must conform to the requirements listed in Section 3.2 of this document.

#### *11.2.2.c Container Requirements*

Containers used to package solid PCB waste must meet the requirements of Section 3.3 of this document. Bulk shipments of PCB-contaminated soil may be transported in plastic-lined trucks.

#### *11.2.2.d Package Weight*

Package weight must not exceed the rated capacity of the container based on DOT-specified package certification tests for the contained material.

#### *11.2.2.e External Package Contamination*

Removable surface radiological contamination must not exceed the limits established by P121, *Radiation Protection*. There must be no PCB contamination on the exterior of the waste package.

#### *11.2.2.f Package Marking and Labeling*

The PCB waste packages must be marked in accordance with Section 3.6 and with the "Caution—Contains PCBs" label described in Section 11.1.7 of this document.

#### *11.2.2.g Additional Requirements*

Radioactively contaminated PCB waste must also meet the requirements of Sections 11.1.8 and 3.7 of this document.

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**Attachment 12. Green is Clean Waste (Page 1 of 4)**

Green-Is-Clean (GIC) waste generated in radiological control areas includes all non-regulated waste that has been actively segregated as "clean" (that is, non-radioactive) through the use of waste-generator acceptable knowledge. This attachment defines the acceptance criteria for GIC wastes.

The Waste Acceptance Criteria (WAC) in this section apply to waste sent to Waste Generator Services (WGS) Green-Is-Clean (GIC) Operations for GIC verification. Waste sent to Technical Area (TA)-54's Decontamination Facility is covered in WAC Attachment 2, *Contact-Handled Transuranic (TRU) Waste*. Waste sent directly from the generator site for recycling or disposal is governed by P121, *Radiation Protection*.

For WAC-specific to low-density materials, see Section 12.1. Guidance for recycling or disposal of all types of GIC waste is provided by the Environmental Protection-Risk Reduction Office (ENV-RRO), Pollution Prevention Program (P2).

The LANL GIC program is supported by

- GIC Verification Operations (GIC Operations) at TA-54, Area G, and
- ENV-RRO Pollution Prevention Program.

Waste accepted by GIC Operations for verification requires a previous site-specific evaluation of applicable waste streams by Waste Management-Waste Management Programs (WM-PROG).

Acceptable knowledge is a waste stream characterization method that can be used to meet all or part of the waste analysis requirements appropriate for the waste media. The method may include documented process knowledge, supplemental waste analysis data, and/or facility records of analysis. Process knowledge is knowledge based on operational experience and can be used to evaluate whether materials have been located or used in a way that could have caused radiological contamination.

Properly segregated GIC waste, supported by generator acceptable knowledge, has a high probability of being free of radioactive contamination. GIC Operations provides a verification check on the acceptable knowledge-based determination that low-density and certain high-density GIC wastes are free of radioactive contamination.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures the Waste Acceptance Criteria regarding allowable radiological levels, of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

## 12.1 Low-Density Materials

Segregated low-density materials are verified to be free of Department of Energy (DOE)–added radioactivity by GIC Operations by using high-sensitivity measurement systems optimized to detect very small quantities of common LANL radionuclides.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 12. Green is Clean Waste (Cont.) (Page 2 of 4)**

### *12.1.1 Waste Form*

GIC waste received by GIC Operations must be in a solid form to minimize the potential for dispersion of materials during handling. The physical, chemical, and biological contents of GIC waste are restricted as noted below.

Small amounts of high-density material such as dirt, dust, or other debris incidentally associated with low-density GIC waste are acceptable. However, dirt and dust contain natural radioactivity that may prevent the waste from passing the verification check.

### *12.1.2 Package Contents*

GIC low-density packages may contain any combination of the following approved materials:

- paper products and cardboard,
- pieces of low-density wood (for example, pine) small enough to fit into the approved containers described in Section 12.1.4,
- plastic products, including common Personal Protective Equipment (PPE) (e.g., gloves, Tyvek™ coveralls), and/or
- cloth or rags, including nylon and other low-density synthetic fabrics.

Paper to be processed through the shredder (e.g., procedures, documents that may contain Unclassified Controlled Nuclear Information [UCNI]) should be packaged separately from items that cannot be shredded. Staples and paper clips attached to paper are acceptable, as is used tape. Thick catalogs, books, or journals (like phone books) should be separated at the binding into sections of 50 pages or less.

### *12.1.3 Restrictions*

The following materials are specifically excluded from processing at the GIC Operations low-density material verification facility:

- metal products, including otherwise low-density items that have metal pieces (for example, three-ring binders);
- other high-density materials, including polyvinyl chloride, concrete, and soil;
- all Resource Conservation and Recovery Act (RCRA)-regulated hazardous waste;
- any material potentially contaminated with tritium and/or C-14;
- classified material;
- absorbed or free liquids;
- immobilized powders;
- aerosol cans or pressurized containers of any kind;
- asbestos;
- Polychlorinated Biphenyl (PCB) waste;
- beryllium;
- infectious and/or medical and/or biological waste;

- explosives;
- glass/sharps: and
- pyrophorics.

Certain materials of moderate density may be acceptable for verification measurement, depending upon the potential radioactive contaminants and the total fraction of moderate-density material in the waste container. For materials that are neither specifically approved nor excluded from GIC waste in the LANL WAC, approval for verification must be obtained from the GIC Operations Supervisor before shipment to TA-54.

### *12.1.4 Container Requirements*

Low-density GIC waste for verification by GIC Operations must be packaged so that the materials present no hazard during shipping, handling, and verification measurement. Low-density waste may be packaged in any of the following:

- GIC green-striped bags
- Other plastic bags or cardboard boxes as approved by the GIC Operations system engineer

***Note:*** The verification instrument utilizes a 30-gallon plastic drum to hold items in position; items that do not fit within the drum will be rejected.

### *12.1.5 Package Weight*

To avoid breakage, low-density GIC packages (boxes, plastic bags, etc.) should not be overburdened. The upper weight limit is 15 kg per package (33 lb), but 10 to 12 kg (22 to 26.5 lb) package limits are optimal for the assay instruments.

### *12.1.6 External Package Contamination/Dose Rate*

GIC packages must exhibit no measurable surface contamination (removable or fixed), and external surface dose rates must not exceed the generating facility's background radiation dose rate.

### *12.1.7 Package Marking and Labeling*

All packages of low-density GIC waste must exhibit a green GIC barcode sticker or other barcode marker approved by the GIC Operations Supervisor. See Section 12.3 for information on obtaining barcode stickers.

### *12.1.8 Green-Is-Clean Low-Density Waste Shipment Documentation*

As indicated on FMU64-F224, *Green is Clean Material Disposal Request Form*, GIC shipments are exempt from Department of Transportation (DOT) regulation by meeting DOT exempt classification standards.

FMU64-F224, which documents acceptable knowledge of material shipped for verification, is to be sent to GIC Operations before shipment for approval by the GIC Operations Systems Engineer.

See Section 12.3 for information on obtaining required forms and approvals.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 12. Green is Clean Waste (Cont.) (Page 4 of 4)**

### 12.2 Documenting Generator Participation in the LANL Green is Clean Effort

Generators preparing GIC shipments for local Radiological Control Technician (RCT) survey and direct release from their facility are encouraged to send their completed FMU64-F224, *Green is Clean Material Disposal Request Form*, to GIC Operations for entry into the database. Whether generators release GIC materials directly or send their GIC materials to GIC Operations at TA-54 for verification, each shipment entered into the GIC database documents a generator's participation in the LANL GIC effort.

***Note:*** Although there is no charge for entering generator-direct-released GIC shipment information into the database, the generator's complete "Cost Center/Program Code/Account Code/Work Package" must be included on the FMU64-F224, because this is the participant's identifier in the database.

### 12.3 Quick Reference for Waste Generators

Obtain a blank copy of FMU64-F224, *Green is Clean Material Disposal Request Form* from the Waste Forms webpage, or for general assistance call the GIC Operations Supervisor at (505) 665-4356.

Generators preparing GIC shipments may obtain GIC green barcode stickers from their Waste Management Coordinator (WMC) or by calling the GIC Operations Supervisor at (505) 665-4356.

For approval before shipment, fax the completed FMU64-F224 form to the GIC Operations Supervisor at Fax No. (505) 665-8347 and scan and email to kgruetzmacher@lanl.gov.

***Reminder***: The waste generator's Cost Center, Program Code, Account Code, and Work Package are required because this is the generator's identifier in the database.

Before waste is accepted by GIC Operations, the following will be verified:

- A completed FMU64-F224 is approved by the GIC Operations Supervisor, and
- Containers display green GIC barcode stickers or other barcode marker approved by the GIC Operations Supervisor.

Shipments for which it is shown that documentation is not in accordance with the LANL WAC must be refused by the GIC Operations Supervisor or designee and will be returned to the waste generator or WMC.

After GIC waste verification is complete and the results have been entered into the GIC database, the GIC Operations Supervisor or designee will notify the waste originator or WMC if any of the GIC waste has failed to meet the acceptance criteria or has failed the verification check. The generator is responsible for disposition of waste that fails the verification check. Due to limited storage facilities, failure to disposition failed GIC waste in a timely manner will result in loss of approval to generate GIC waste.

The TA-54 WMC will process failed items. Generators will be charged to their cost codes and must enter applicable information into the FMU64-F224. Failed items are processed at TA-54.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 13. New Mexico Special Waste (Page 1 of 3)**

This section describes the requirements for the storage of New Mexico special waste at Technical Area (TA)-54.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures and the Waste Acceptance Criteria regarding allowable radiological levels, of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

For the purpose of this document, New Mexico "special waste" refers to the following types of waste:

- Treated, Formerly Characteristic Hazardous Waste (TFCHW);
- industrial process waste, which is solid waste resulting from industrial processes, such as sludge from the Sanitary Wastewater System (SWWS) plant, factories, processing plants, and repair and cleaning establishments, and waste that, unless specially handled or disposed, may harm the environment or endanger the public health or safety;
- residue from a spill of a chemical substance or commercial product (including contaminated soils) that, unless specially handled or disposed, may harm the environment or endanger the public health or safety;
- ash; and
- petroleum-contaminated soil, that has a sum of benzene, toluene, ethylbenzene, and xylene isomer concentrations of greater than 50 mg/kg, or benzene concentration individually greater than 10 mg/kg, or a total petroleum hydrocarbon concentration of greater than 100 mg/kg (IF, it is not a Resource Conservation and Recovery Act (RCRA)-hazardous waste, i.e., Waste Code D018 for benzene). Analysis via the Toxicity Characteristic Leaching Procedure (TCLP) is applicable for waste containing greater than 10 ppm benzene (totals) OR media generated from actions under 40 CFR 280, *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks* (i.e., Underground Storage Tank [UST] remediation).

***Note***: Regulated Asbestos Waste, which is addressed in Attachment 9, *Asbestos Waste,* and Infectious Waste, which is addressed in Attachment 10, *Infectious/Medical/Biological Waste,* and Sludges, (not addressed in this document) are also regulated as New Mexico Special Wastes, but are not addressed in this Attachment.

## 13.1 Waste Form

TFCHW must have been treated according to the applicable operating procedure to eliminate the RCRA characteristic by neutralizing the pH, reducing the reactivity or the ignitability of the waste, or by reducing the extractable concentration of the metallic or organic toxic component of the waste as determined by TCLP. The treated waste must then be solidified. New Mexico special waste destined for TA-54 may not contain free liquids. Free liquids must be absorbed sufficiently to pass the paint-filter test.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 13. New Mexico Special Waste (Cont.) (Page 2 of 3)**

The physical, chemical, and hazardous characteristics of the waste must be documented. New Mexico special wastes must be evaluated for ignitability, corrosivity, reactivity, toxicity, free liquids, other applicable parameters, RCRA Subtitle C listed wastes (40 CFR 261, *Identification and Listing of Hazardous Waste*) Toxic Substance Control Act (TSCA)-regulated constituents, and other applicable regulated constituents. If applicable, based on acceptable knowledge, petroleum-contaminated soils must also be analyzed for total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylene, and any other applicable contaminants.

Noncontaminated sand and ash from high-explosive operations must be segregated from barium-contaminated sand and ash, based on knowledge of the chemical composition of the material and analysis, if performed.

### 13.2 Package Contents

Packaging must comply with United Nations (UN) specifications.

### 13.3 Container Requirements

New Mexico special waste that is considered a hazardous material by the Department of Transportation (DOT) must be packaged according to DOT regulations. The waste should be packaged in the smallest container possible. The container must be in good condition, without severe rust, dents, deep scratches, bulges, or other structural defects. The container must be compatible with the waste it contains, meet UN specifications, and be closed according to UN specifications.

Each waste container must comply with the following capacity criteria, as they apply:

- Waste must be prepackaged to meet UN specifications.
- Waste should be packaged in the smallest container possible.
- Overpack drums with more than a 55-gal. capacity may be used only to contain defective waste containers.

The generator must repackage any waste or overpack any waste container that does not meet these Waste Acceptance Criteria (WAC).

### 13.4 Package Weight

The maximum acceptable net weight for bulk (55-gal.) waste containers is the rated capacity of the container based on UN-specified package certification tests for the contained material.

### 13.5 External Package Contamination

There must be no chemical contamination on the exterior of the package. Contaminated packaging must be overpacked.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 13. New Mexico Special Waste (Cont.) (Page 3 of 3)**

### 13.6 Package Marking and Labeling

Containers of New Mexico special waste must have a marking describing the contents and potential health, safety, and environmental hazards associated with the waste. The container must also be marked with a LANL-approved New Mexico Special Waste label. Contact geri@lanl.gov for the label. For TFCHW, the marking must indicate that no hazards are associated with the waste. If the waste is also regulated by DOT, the marking must include the DOT proper shipping name and identification number, and the container must have the appropriate DOT label.

### 13.7 Additional Requirements

Disposal requests for New Mexico special waste must be submitted at least 45 days before exceeding the 90 day storage requirement.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 14. Non-Hazardous Waste (Page 1 of 3)**

For the purpose of these Waste Acceptance Criteria (WAC), nonhazardous waste is any waste managed at Technical Area (TA)-54 that does not fit into any other waste category listed in this document. Nonhazardous waste may be described as any nonradioactive waste that is not regulated by the Environmental Protection Agency (EPA) through the Resource Conservation and Recovery Act (RCRA) or through the Toxic Substance Control Act (TSCA). Nonhazardous waste may still be regulated by the Department of Transportation (DOT) as a hazardous material.

## 14.1 Waste Form

There are no restrictions on the form of nonhazardous waste that can be stored in TA-54.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures and the Waste Acceptance Criteria regarding allowable radiological levels, of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

## 14.2 Package Contents

Unknown wastes will not be accepted for storage at TA-54. An approved Waste Stream Profile (WSP) must be provided before acceptance at TA-54. Each container of waste may contain both liquid waste and solid waste if the waste is non-RCRA and non-DOT material. All wastes placed or accumulated in a container must be compatible with each other. Incompatible wastes must be segregated.

## 14.3 Container Requirements

If the nonhazardous waste is regulated by the DOT, the container must comply with the regulations established in 49 CFR 172, *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements*, 49 CFR 173, *Shippers—General Requirements For Shipments and Packagings*, and 49 CFR 178, *Specifications for Packagings*. The container must be in good condition, without severe rust, dents, deep scratches, bulges, or other structural defects. The container must be compatible with the waste it contains and must be closed according to United Nations (UN) specifications.

Gas cylinders must also meet specific criteria of 49 CFR 178, Subpart C, to be accepted for transport. The cylinders must not have welded seams, must have the appropriate valve, and must be approved by the DOT for the contained material. The gas cylinder's UN specification number must be included on the on-line Waste Disposition Request (WDR), found in WCATS.

### *14.3.1 Container Capacity*

Each waste container must comply with the following capacity criteria, as they apply:

- Waste must be prepackaged to meet DOT specifications.

- Containers of a volume less than 19 liters (5 gal.) and <50 lb must be placed in a DOT approved combination packaging or in a lab-pack container per 49 CFR 173.12, *Exceptions for Shipment of Waste Materials.*
- Containers of a volume greater than 5 gal. or >50 lbs must be packaged in a DOT single packaging (no combination packaging).
- Overpack drums with more than a 55-gal. capacity may be used only to contain defective waste containers.

#### *14.3.2 Lab Pack Criteria*

For waste to be considered for lab packing, the criteria of 49 CFR 173.12 must be met. The generator must repackage any waste or overpack any waste container that does not meet the applicable acceptance criteria.

#### *14.3.3 Headspace in Containers with Liquid*

According to 49 CFR 173.24, *General Requirements For Packagings and Packages*, (h), sufficient ullage (outage or headspace) must be left when filling receptacles with liquids. Liquids may expand because of temperature changes during transportation. Headspace must be sufficient to prevent leakage or permanent distortion of the packaging or receptacle resulting from this expansion. Liquids must not completely fill a receptacle at a temperature of 131ºF or less (49 CFR 173.24a[d]). Containers must not be filled with liquids to more than 85% of their rated capacity. For example, Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW) has determined that a 6-in. headspace should be left in a 55-gal. drum.

#### *14.3.4 Beryllium*

Beryllium waste must be double-bagged or double-wrapped.

### 14.4 Package Weight

The maximum acceptable net weight for bulk (55-gal.) waste is the rated capacity of the container based on UN-specified package certification tests for the contained material, whichever is less. The maximum acceptable gross weight for lab-packed waste is 205 kg (452 lb), or the rated capacity of the container, whichever is less.

### 14.5 External Package Contamination

There must be no external chemical contamination on any waste package. Externally contaminated packages must be overpacked, or the waste must be repackaged.

### 14.6 Package Marking and Labeling

Each container of nonhazardous waste must have a non-hazardous waste marking and any other DOT-required labels. The non-hazardous waste marking must contain the DOT proper shipping name and identification number. The proper shipping name must include technical names of the hazardous components, if applicable. Beryllium waste must be marked with the warning shown in Fig. 14-1.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 14. Non-Hazardous Waste (Cont.) (Page 3 of 3)**

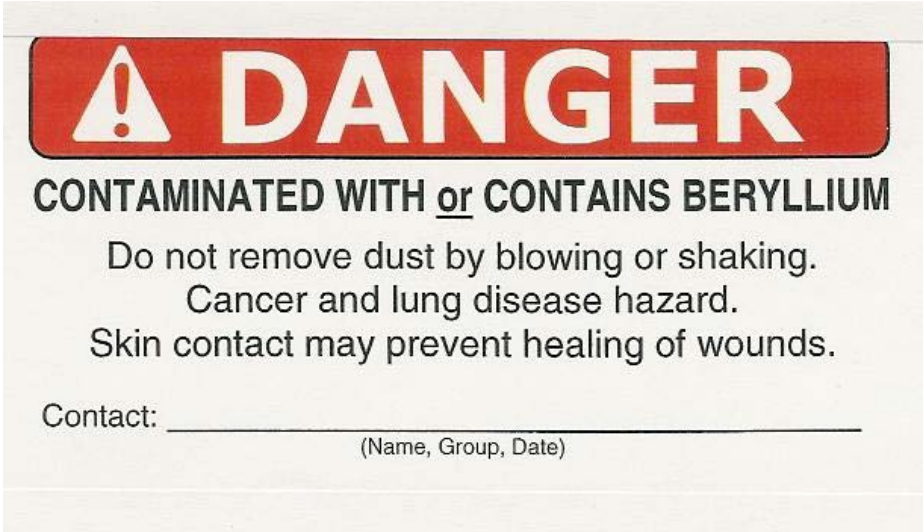


**Fig. 14-1. Warning label required for beryllium packages.**

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**Attachment 15. Dumpster Waste (Page 1 of 3)**

LANL has many dumpsters on-site that are designated for compactable sanitary solid waste trash only. The following items should never be placed into a trash dumpster at LANL:

- radioactive waste;
- Toxic Substance Control Act (TSCA)-regulated Polychlorinated Biphenyl (PCB) waste (e.g., equipment, tar impregnated wire, PCB-contaminated oil-stained equipment);
- hazardous or mixed waste;
- New Mexico special waste;
- universal waste;
- used oil;
- ammunition or explosives;
- asbestos or asbestos-containing material;
- PCB-containing items;
- infectious or biological waste;
- rodents or droppings (except debris from the rodent control program);
- respirator cartridges;
- oil filters;
- chemical or product containers containing the product (such as paint cans and glass chemical bottles, etc.)
- aerosol cans;
- gas cylinders;
- classified, sensitive, personal identifiable information, or Unclassified Controlled Nuclear Information (UCNI) labeled materials;
- radioactive, hazardous, or classified labels that contain LANL information;
- light bulbs and ballasts;
- batteries, including NiCad, gel cell, lithium, lead acid batteries; small alkaline batteries are permissible;
- smoke detectors;
- tritium exit signs;
- electronics;
- construction and demolition debris;
- wood scraps and pallets (refer to Section 15.1.1 for more information on how to manage wood scraps and pallets);
- circuit boards;
- thermometers;
- flammables or material that can spontaneously combust;

- corrosives;
- pharmaceuticals;
- poison;
- metal or metal wiring (electrical or communication wires) (refer to Attachment 19, *Non-Hazardous, Non-Radioactive Scrap Metal*, for how to recycle or dispose of metal); or
- recyclable material, such as paper products, aluminum cans, and plastic bottles.

Contact a Waste Management Coordinator (WMC) for assistance with disposal of any of these items. Contact Utilities and Infrastructure (U&I) by emailing wastenot@lanl.gov if the dumpster in your area is full before the regularly scheduled pickup.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures and the Waste Acceptance Criteria regarding allowable radiological levels or off-site Treatment or Storage to which the waste is destined for treatment and/or disposal.

Submit a Facility Service Request under *Utilities & Infrastructure—Dumpster Service* to request a new dumpster; request dumpster service, such as to fix a broken lid; or to request a dumpster for clean (non-contaminated, non-radioactive) non-compactable waste.

## 15.1 Recycling at LANL

LANL has a recycling program in place for many types of materials. It is environmentally and financially beneficial to recycle whenever possible, as long as the materials are not chemically or radioactively contaminated and it is also a Department of Energy (DOE) requirement to recycle. For more information, see the LANL recycle website at http://int.lanl.gov/recycle.

### *15.1.1 Types of Recyclables*

Cardboard dumpsters exist at almost every LANL Technical Area (TA). Remove internal plastic and Styrofoam™ packing materials and flatten cardboard as much as possible before placing into the dumpster. Contact U&I by e-mailing wastenot@lanl.gov if the dumpster in your area is full before the regularly scheduled pickup.

Roll carts are available for aluminum cans and plastic containers. Clean aluminum cans, steel cans, and plastic bottles (no food debris) with recycling codes 1 and 2 can be placed in these bins. E-mail wastenot@lanl.gov if you need a bin or if the bin in your Area is full before the regularly scheduled pickup.

Mixed-paper roll carts are available in every building at LANL. Place only non-classified, non-sensitive paper products in these bins. For a full list of acceptable recycled paper products, visit http://int.lanl.gov/environment/p2/recycle/detail.shtml. Plastic bags of shredded paper can be placed into or next to these bins as well. E-mail wastenot@lanl.gov if the roll cart in your Area is full before the regularly scheduled pickup.

Office items such as batteries, aerosol cans, and light bulbs can be recycled. Contact your group's WMC for assistance with management of these items.

Non-contaminated, non-radioactive concrete, asphalt, and soil can all be recycled. Generators who want to recycle concrete, asphalt, and soil off-site have to obtain approval from Environmental Protection-Water Quality and RCRA (ENV-RCRA) in accordance with P101-17, *Excavation/Fill/Soil Disturbance,* before off-site disposition. Contact ENV-RCRA at (505) 667-0666 for instructions on handling these materials for recycling.

Transparencies that do not contain classified or sensitive information can be recycled by putting the transparencies into an interoffice envelope marked “A1000–transparencies.”

Toner cartridges can be recycled by placing the toner cartridge into a box, marking the box “A1000–toner cartridge,” and placing the box in the designated area for your group.

Scrap metal that is not radioactively or chemically contaminated can be recycled through the LANL recycle program. You can request a 15- or 30-yard roll-off bin by e-mailing wastenot@lanl.gov. Please refer to the DOE moratorium on metal recycling for further information. (See Attachment 19, *Non-Hazardous, Non-Radioactive Scrap Metal*, of this document for more information on recycling non-hazardous, non-radioactive metals.)

Wood scraps, such as broken wood pallets, are managed through the Material Recycling Facility (MRF). Pallets that are in good, reusable condition should be taken to Salvage. E-mail salvage@lanl.gov for information. Generators should request a 30-yard roll-off bin for collection of broken wood pallets and other wood products. To request a roll-off bin, e-mail wastenot@lanl.gov.

## 15.2 Salvage

Usable office equipment and furniture can be sent to the LANL Salvage operation for internal reuse or public resale. Usable and broken electronics also can be sent to LANL Salvage for auction. You must contact your group’s property administrator for assistance. If you need LANL Salvage to pick up non-barcoded equipment, furniture, or electronics, e-mail salvage@lanl.gov.

For more information, see the LANL recycle website at http://int.lanl.gov/environment/p2/recycle/index.shtml.

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**Attachment 16. Sanitary Wastewater System (SWWS) (Page 1 of 10)**

## 16.1 Facility Requirements

The purpose of the Waste Acceptance Criteria (WAC) for the Technical Area (TA)-46 Sanitary Wastewater System (SWWS) Plant is to ensure compliance with the Laboratory's National Pollutant Discharge Elimination System (NPDES) Outfall Permit and the SWWS Plant's Groundwater Discharge Permit and to assure against operational upsets of the physical and biological processes of the plant caused by incompatible waste streams.

Sanitary sewer waste, including bathroom waste, kitchen waste, janitorial waste from non-rad areas, and de minimus quantities of cooling and boiler blowdown from equipment rooms and from other sources, is acceptable for discharge into the SWWS Plant. Industrial wastewater, including radioactive waste, chemical waste, high explosives waste, and other industrial waste is not acceptable for discharge into the SWWS Plant.

The SWWS WAC Committee is responsible for the review and approval/disapproval of proposed wastestreams that do not meet the WAC. The SWWS WAC Committee includes five members: the SWWS plant operations manager; the sampling representative from the Environmental Protection-Water Quality and RCRA (ENV-RCRA) group; the SWWS plant system engineer for the Laboratory's Utilities and Institutional Facilities (UI) Organization; the NPDES Outfall Permit Program Lead for ENV-RCRA; and a representative from the Sanitary Effluent Reclamation Facility.

Sanitary sewer waste acceptable for treatment at the SWWS Plant is usually discharged into drains or sinks. Before discharging treated effluent to the environment, the SWWS Plant treats the sanitary sewer waste water to meet the effluent limits specified in the Laboratory's NPDES Permit No. NM0028355. Most sanitary sewer waste is discharged directly into the SWWS Plant through the sanitary sewer collection system. A smaller volume is transported to the SWWS Plant from sanitary holding tanks, septic tank systems, wastewater containers, and portable toilets. SWWS Plant personnel periodically pump these sources and truck the waste to the SWWS Plant.

SWWS Plant WAC are based on the following requirements:

- As-Low-As-Reasonably Achievable (ALARA) Laboratory policy
- Clean Water Act (The Federal Water Pollution Control Act)
- Department of Transportation (DOT) Regulations
- Department of Energy (DOE) O 5400.5, *Radiation Protection of the Public and the Environment*
- Los Alamos National Laboratory Hazardous Waste Facility Permit (December 2010), EPA ID# NM0890010515
- New Mexico Solid Waste Regulations (disposal of sludge, grit, and screenings)
- New Mexico Water Quality Act
- New Mexico Water Quality Control Commission (WQCC) Regulations
- NPDES Outfall Permit No. NM0028355
- Toxic Substance Control Act (TSCA)
- Water Quality Standards for Interstate and Intrastate Streams in New Mexico
- Groundwater Discharge Permit for the SWWS Plant, DP-857
- New Mexico Liquid Waste Disposal Regulations

## 16.2 Transportation Requirements

Typically, sanitary sewer waste is transferred to the SWWS Plant through the sanitary sewer collection system; however, SWWS Plant personnel transport some sanitary sewer waste to the SWWS Plant from waste generation points where the sanitary collection system is unavailable. SWWS Plant personnel have been instructed not to transport wastewater to the SWWS Plant until after an activated, approved Waste Stream Profile (WSP) has been completed.

Waste generators must notify SWWS Plant personnel at least 48 hours before pickup and transport of wastewater to the SWWS Plant. Before pickup, SWWS Plant personnel will contact the waste generator to coordinate the time and location of the pickup. The waste generator or the Waste Management Coordinator (WMC) must be present at the time and location of pickup to ensure that the correct tanks are pumped. Failure to have a waste generator or WMC at the designated site and time may result in the delay of wastewater pickup.

All sanitary sewer waste will be hauled by the SWWS vacuum truck to the SWWS, no exceptions.

## 16.3 Waste Stream Profile (WSP)

All new waste streams (excluding sanitary wastewater from restrooms, drinking water fountains, showers, and office-type kitchens) to be discharged or transported to the SWWS Plant must be evaluated by SWWS Management or designee. The waste generator is responsible for completing a new waste stream. Instructions for completing a WSP are included in the WCATS User's Manual.

Acceptable knowledge criteria may be used to complete a WSP instead of analytical data for new waste streams originating from new buildings and facilities (with previous approval from the SWWS WAC Committee). All waste streams originating from existing holding tanks, septic tank systems, and containers must have an approved WSP on file with the waste services coordinator before transport of sewer waste to the SWWS Plant. WSPs for sanitary sewer waste from holding tanks, septic tank systems, and other sources are valid for one year and may be extended by the waste generator annually if the waste stream has not changed up to maximum of three years.

If a change is planned to a waste stream discharged into the sanitary sewer collection system or transported to the SWWS Plant, the waste generator must notify ENV-RCRA and complete a new WSP before discharge or transport. The waste generator must also notify the SWWS plant manager or SWWS plant system engineer of any changes in waste stream discharges (i.e., quantity and/or quality). Examples of changes include both changes in contaminant loading and volume of sanitary sewer waste. All sampling of waste streams at LANL must be sampled by an approved independent and experienced entity in accordance with the SWWS Committee requirements.

The waste generator must provide a charge account number for sampling, investigation, preparation of work package, and/or pumping of the waste stream. A charge number must be issued by the group requesting SWWS personnel to pump approved wastewater streams contained in tanks, drums or other types of containment. Routine pumping or establishment of portable toilets will require a new work order number each Fiscal Year (FY) and a site specific hazard form.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 16. Sanitary Wastewater System (SWWS) (Cont.) (Page 3 of 10)**

## 16.4 Waste Acceptance Criteria (WAC)

All sanitary sewer waste discharged or transported to the SWWS Plant must meet the WAC described in this section. If a waste generator is planning a new waste stream or believes that a planned change is likely to exceed the limits set forth in Tables 16-1, 16-2, or 16-3, the waste generator must complete a WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) and obtain approval from the SWWS WAC Committee *before* discharge or transport.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 16. Sanitary Wastewater System (SWWS) (Cont.) (Page 4 of 10)**

**Table 16-1. Waste Acceptance Criteria (WAC) for Discharges to the Sanitary Wastewater System (SWWS) Plant**
(All metal concentrations are for the total metal concentrations present in the sample.)

| Contaminant | Limits at a Flow Rate of 100 gal./day or Less | Limits at a Flow Rate Greater than 100 gal./day |
|---|---|---|
| pH (If <100 gal/day pH 5.0 acceptable per Table 16-1) | 5–11 SU | 5.5–11 SU |
| Chemical Oxygen Demand (COD) | ≤750 mg/L | ≤500 mg/L |
| Microtox® results | <55% screen<br>>20% EC50 | <50% screen<br>>25% EC50 |
| Temperature | ≤180°F | ≤140°F |
| Total Suspended Solids (TSS) | ≤330 mg/L | ≤330 mg/L |
| Total Dissolved Solids (TDS) | ≤1,000 mg/L | ≤1,000 mg/L |
| Oil and grease | <100.0 mg/L | <50.0 mg/L |
| Aluminum | <5.0 mg/L | <5.0 mg/L |
| Arsenic | <0.2 mg/L | <0.1 mg/L |
| Barium | <40.0 mg/L | <20.0 mg/L |
| Beryllium | <0.01 mg/L | <0.01 mg/L |
| Boron | <2.0 mg/L | <1.0 mg/L |
| Cadmium | <0.1 mg/L | <0.05 mg/L |
| Chromium | <3.8 mg/L | <1.9 mg/L |
| Cobalt | <2.2 mg/L | <1.1 mg/L |
| Copper | <1.0 mg/L | <0.5 mg/L |
| Cyanide (total) | <5.0 mg/L | <0.34 mg/L |
| Fluoride | <180.0 mg/L | <80.0 mg/L |
| Iron | <100.0 mg/L | <35.0 mg/L |
| Lead | <0.4 mg/L | <0.2 mg/L |
| Magnesium | <100.0 mg/L | <50.0 mg/L |
| Manganese | ≤10.0 mg/L | <7.5 mg/L |
| Mercury (total) | <1.5 µg/L | <0.77 µg/L |
| Molybdenum | <4.0 mg/L | <2.0 mg/L |
| Nickel | <0.5 mg/L | ≤0.25 mg/L |
| Nitrogen (total) | ≤100 mg/L | ≤50 mg/L |
| Phosphorus (total) | <80.0 mg/L | <40.0 mg/L |
| Polychlorinated Biphenyls (PCBs) | none detected | none detected |
| Selenium | <5.0 µg/L | <5.0 µg/L |
| Silver | <5.0 mg/L | <1.0 mg/L |
| Vanadium | <0.2 mg/L | <0.1 mg/L |
| Zinc | <10.0 mg/L | <0.5 mg/L |

**Table 16-2. Limits for Radioactivity (Drinking Water Limits)**

| Parameter | Limit (pCi/L) |
|---|---|
| Gross Alpha | 15 |
| Gross Beta | 50 |
| Tritium | 20,000 |

**Radionuclides**—Sanitary sewer waste exceeding the drinking water limits for radioactivity shown in Table 16-2 cannot be discharged into the SWWS Plant. A radioactive source facility must not discharge a radioactive waste stream into the sanitary sewer collection system for treatment at the SWWS Plant.

**pH**—Sanitary sewer waste with a pH less than 5.5 or greater than 11.0 standard units is not acceptable for treatment at the SWWS Plant.

**Chemical Waste**—The SWWS Plant is regulated under NPDES Outfall Permit No. NM0028355 and under Groundwater Discharge Permit No. DP-857. The SWWS Plant is not a permitted facility under the Laboratory's RCRA permit. Wastes regulated under RCRA (such as acetone, methyl-ethyl-ketone [MEK], 1,1,1-trichloroethane [TCA], and electroplating wastes) are not accepted for treatment at the SWWS Plant. For additional information concerning the disposal of RCRA waste, contact the ENV-RCRA group. Sanitary sewer waste not regulated by RCRA may be accepted for treatment at the SWWS Plant on a case-by-case basis depending on the chemical constituents, concentrations, and volumes generated. All sanitary sewer waste must meet the SWWS Plant WAC listed in Table 16-1, unless a WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) is completed by the waste generator and approved by the SWWS WAC Committee.

**Nitrogen**—Total nitrogen concentrations in sanitary sewer waste must not exceed 100 mg/L for flow rates less than or equal to 100 gallons per day and must not exceed 50 mg/L for flow rates greater than 100 gallons per day. Waste streams containing nitrogen in excess of the SWWS Plant WAC will be evaluated on a case-by-case basis. A WEF (Form 1973) must be completed by the waste generator and approved by the SWWS WAC Committee for any exceptions.

**Metals**—Sanitary sewer waste containing metals at levels regulated by RCRA (See Table 1-4 of Attachment 1, *Radioactive Liquid Waste Treatment Facility [RLWTF]*) are not accepted for treatment at the SWWS; therefore, the metal concentrations must not exceed the limits shown in Table 1-4. A WEF (*Waste Acceptance Criteria Exception Form)* must be completed by the waste generator and approved by the SWWS WAC Committee for any exceptions.

**Temperature**—The temperature of sanitary sewer waste discharged into the sanitary sewer collection system must not exceed 60°C (140°F) unless the flow rate of the waste is less than 100 gallons per day, in which case the temperature must not exceed 82.2°C (180°F).

**Toxicity**—All wastes must meet the Microtox® requirements for toxicity before discharge to the SWWS Plant at a dilution representing the actual dilution of the liquid waste discharged into the sanitary collection system. A WEF (Form 1973) must be completed by the waste generator and approved by the SWWS WAC Committee for any exceptions.

**Microtox® Measures the Toxicity of Aqueous Solutions**—The light output of the Microtox® reagent, a suspension of luminescent bacteria, is measured before and after the reagent is exposed to the sample being tested. When toxic materials inhibit bacterial metabolism, light output drops in proportion to the toxicity. The Microtox® testing method has been included in the 19th Edition of *Standard Methods for the Analysis of Water and Wastewater*. The Biochemical Oxygen Demand (BOD) test per limits noted will be utilized in place of the Microtox® test when a laboratory is not available to conduct the Microtox® test.

**BOD5, Biochemical Oxygen Demand**—This is a microbial bioassay test conducted over a five day period. Acceptable limits will be a maximum of 500 mg/L BOD5 for less than 100 gallons; and a maximum of 300 mg/L BOD5 for greater than 100 gallons.

**Chlorine from Disinfection of Water Supply Facilities**—Sanitary sewer waste volumes of less than 20 gallons may be discharged directly to the SWWS Plant without regard to chlorine concentration. Volumes greater than 20 gallons but less than 1,000 gallons must be de-chlorinated to less than 3 ppm before discharge to the SWWS Plant. Volumes greater than 1,000 gallons must be reviewed and approved by the SWWS WAC Committee on a case-by-case basis before discharge. The waste generator must submit a WEF as noted in Section 16.8.

**Sample Location**—Samples for evaluation of contaminants must be taken as close to the point of discharge into the sanitary sewer collection system as possible. When sampling cannot be completed at the point of discharge, samples should be taken at the first available manhole or sampling port downstream of the point of discharge.

**Prohibited Waste**—Table 16-3 lists the categories of waste that are not acceptable for discharge or transport to the SWWS Plant.

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**Attachment 16. Sanitary Wastewater System (SWWS) (Cont.) (Page 7 of 10)**

| **Table 16-3. Waste Prohibited at the Sanitary Wastewater System (SWWS) Plant** |
|---|
| **Resource Conservation and Recovery Act (RCRA) Regulated Waste** |
| Waste exhibiting the characteristic of ignitability as defined in 40 CFR 261.21, *Identification and Listing of Hazardous Waste, Characteristic of ignitability*<br>Waste exhibiting the characteristic of reactivity as defined in 40 CFR 261.23, *Identification and Listing of Hazardous Waste, Characteristic of reactivity*<br>Waste exhibiting the characteristic of toxicity as defined in 40 CFR 261.24, *Identification and Listing of Hazardous Waste, Toxicity characteristic*<br>F-listed waste as defined in 40 CFR 261.31, *Identification and Listing of Hazardous Waste, Hazardous wastes from non-specific sources*<br>K-listed waste as defined in 40 CFR 261.32, *Identification and Listing of Hazardous Waste, Hazardous wastes from specific sources*<br>P-listed waste as defined in 40 CFR 261.33, *Identification and Listing of Hazardous Waste, Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof*<br>U-listed waste as defined in 40 CFR 261.33 |
| **Other Prohibited Waste** |
| Cooling tower and boiler blowdown in excess of 500 gallons per day<br>Polychlorinated Biphenyls (PCBs)<br>Sanitary sewer at temperatures >140°F for flows >100 gal./day<br>Sanitary sewer at temperatures >180°F<br>Non-aqueous waste<br>Medical waste<br>Radioactive waste<br>Toxic waste (as defined by Microtox® methodology)<br>Non-characterized holding tank or septic tank system<br>Surface drainage<br>Roof drainage<br>Surface-active agents, excessive detergents, or other substances that may cause excessive foaming in the SWWS Plant<br>Dilution water added to achieve compliance with any of requirements of the SWWS/Waste Acceptance Criteria (WAC) |

## 16.5 Holding Tank and Septic Tank Systems

Holding tank and septic-tank systems must have an approved WSP on file with the waste services coordinator before transport of sanitary sewer waste to the SWWS Plant. Sanitary sewer wastes from holding tank and septic tank systems are subject to the WAC requirements listed in Table 16-4. As needed, sanitary sewer waste from septic tank systems will receive additional pretreatment and low-flow discharge into the SWWS Plant at the discretion of the SWWS Plant Operations Manager (superintendent) to ensure that the sanitary sewer wastes do not cause plant upsets or non-compliances.

**Table 16-4. Waste Acceptance Criteria (WAC) for Holding Tank and Septic Tank Systems**

| | Holding Tank | Septic Tank Systems |
|---|---|---|
| Chemical Oxygen Demand (COD) | 1,500 mg/L | 8,000 mg/L |
| Total Suspended Solids (TSS) | 5,000 mg/L | 15,000 mg/L |
| TDS | 10,000 mg/L | N/A |
| Total N | 300 mg/L | 500 mg/L |
| Total P | 200 mg/L | N/A |
| Oil and grease | 200 mg/L | 350 mg/L |
| Microtox® test | <55% (screen) and >20% (EC50) | N/A |
| RDX | 0.0 mg/L | 0.2 mg/L |

A sign designating the holding tank or septic tank system number must be provided at the tank location. Waste generators must provide for roadways to on-site holding tank and septic tank systems that are adequate for pump truck use with no restrictions to access. All septic and holding tanks and related equipment must be plainly visible and protected from any snow removal activities. Tanks must have adequate capacity to contain the sanitary flow from connected buildings. The facility operations director must ensure that new or upgraded installations must be equipped with high-level alarms for holding tanks. The alarm light must be visible to building residents. All holding tanks and septic tanks without an approved WSP must be characterized before any pumping activities. It is the waste generator's responsibility that all WAC requirements for holding tank and septic tank systems are met before pumping and transport of sanitary sewer waste to the SWWS Plant. Waste generators must provide at least a 48 hour notice to SWWS Plant personnel before sanitary sewer waste transport.

To ensure the integrity of the SWWS Plant and to maintain compliance with the Laboratory's NPDES permit, additional sampling (including, but not limited to SWWS WAC parameters, RCRA parameters, and various metals) may be required for holding tank and septic tank systems that have not been pumped within the past three years.

## 16.6 Portable Toilets

Sanitary sewer waste from portable toilets used at construction sites or for other activities at the Laboratory may be transported to the SWWS Plant for treatment and disposal. To coordinate arrangements for this service, provide an appropriate Facilities Service Request for the required service. Request for Services under BLDG must be "U&I – Waste Water."

## 16.7 Additional Requirements

### *16.7.1 Posting of Sinks and Drains Connected to the Sanitary Wastewater System (SWWS) Plant*

Each sink or drain connected to the sanitary sewer collection system, a holding tank, or septic tank system must be posted with a sign informing the user of the requirements for disposing of sanitary sewer waste down the sink or drain. The approved sign may be obtained on the Waste Management Signs website. The waste generator is responsible for ensuring that all sinks are posted with the most current sign.

### *16.7.2 Labeling of Sanitary Sewer Lines*

Sanitary sewer lines that are visible inside buildings are the responsibility of the building manager and must be labeled "Sanitary Sewer."

### *16.7.3 Waste Acceptance Criteria (WAC) Non-Compliance and Monitoring*

Non-compliance with SWWS Plant WAC requirements may result in termination of SWWS Plant treatment and disposal services upon recommendation of the SWWS WAC Committee and approval by UI. It is then the waste generator's responsibility to find alternative means and methods of disposal that comply with federal and state environmental regulations. Waste stream monitoring must be conducted by Laboratory environmental personnel as required to ensure compliance with the SWWS WAC.

## 16.8 Waste Acceptance Criteria Exception Form (WEF)

Some waste streams that do not meet all of the requirements of the SWWS Plant WAC may be acceptable for treatment at the SWWS Plant. An exception from a WAC requirement may be requested by a waste generator by completing the WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) and submitting it to the waste services coordinator and SWWS WAC Committee. The Committee will evaluate the WEF (Form 1973) and approve or disapprove the proposed exception. Conditions of approval may include pretreatment and/or low-flow discharge into the SWWS Plant. Decisions of the Committee may be appealed to UI. The decision of UI is final.

## 16.9 Notification

The Generating Group must notify the SWWS WAC Committee in writing of any of the following:

1. Changes to the generator's WSP and WEF (Form 1973, *Waste Acceptance Criteria Exception Form*).
2. Significant modification to the quality or quantity of the industrial waste water discharge.
3. Discharge into the SWWS of any substance which, if otherwise disposed of, would be a hazardous waste under 40 CFR 261, *Identification and Listing of Hazardous Waste*.

### 16.10 Inspections and Audits

The SWWS WAC Committee may inspect and audit generator documentation, such as WSPs and WEFs (Form 1973, *Waste Acceptance Criteria Exception Forms*), against actual discharges to the SWWS. The SWWS WAC Committee may periodically inspect generator facilities for compliance with this section. In addition, the SWWS WAC Committee may perform or require scheduled or non-scheduled monitoring of discharges from wastewater-generating facilities.

### 16.11 Nonconformance

The SWWS WAC Committee may issue a nonconformance report in accordance with P330-6, *Nonconformance Reporting* to any generating group that discharges or transports a waste stream to the SWWS that does not meet the criteria outlined in this attachment and for which a WAC exception was not approved by the SWWS WAC Committee. The issues and corrective action management process described in P322-4, *Laboratory Performance Feedback and Improvement Process*, must be used to document the root cause, corrective action and actions to preclude recurrence, and the results will be submitted by the generating group to the RLWTF.

### 16.12 Record Keeping

The Generator is required to maintain records of:

- monitoring activities,
- inspection, non-conformance and corrective action reports, and
- WSP and WEFs (Form 1973, *Waste Acceptance Criteria Exception Forms*).

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 17. Waste Acceptance at the Nevada National Security Site (NNSS) (Page 1 of 41)**

Solid Low-Level Waste (LLW) that is intended for disposal at the Nevada National Security Site (NNSS) must follow the requirements stated in this attachment. Generators must ensure that waste is handled, stored, and shipped in accordance with applicable Department of Energy (DOE), Department of Transportation (DOT), Environmental Protection Agency (EPA), state, and local regulations and requirements. Before the waste is generated and/or packaged, the generator and LANL NNSS Certification Team must consult and agree on which waste streams must be prepared for disposal at NNSS. This Waste Acceptance Criteria (WAC) attachment applies only to LLW and Mixed Low-Level Waste (MLLW) destined for disposal at NNSS. The majority of the requirements outlined in this attachment are retrieved or derived from the Nevada National Security Site Waste Acceptance Criteria (NNSS WAC).

Off-site disposal at sites other than NNSS is also possible under some circumstances. Contact your Waste Management Coordinator (WMC) or the LANL Waste Certification Official (WCO) for more information.

LANL waste generators are responsible for providing complete and accurate waste information as required by this attachment. Waste generators will document this information using the Waste Stream Profile (WSP), including ENV-RCRA-Tool 313, *Waste Profile Extension*, and the on-line Waste Disposition Request (WDR) found in WCATS. LANL NNSS Certification Team personnel will complete the Nevada National Security Site-Waste Profile (NNSS-WP) and the Package Storage and Disposal Request (PSDR) based on information provided by the waste generator on the WSP and the on-line WDR.

Waste accepted at the NNSS must meet the waste criteria outlined below. Generators must ensure that waste is handled, stored, and shipped in accordance with applicable DOE, DOT, U.S. EPA, state, and local regulations and requirements. Waste streams deviating from these requirements will be evaluated in accordance with Section 17.4.

## 17.1 General Waste Form Criteria

These waste criteria are based on DOE waste management policies and practices.

### *17.1.1 Transuranics*

The concentration of alpha-emitting transuranic nuclides with half-lives greater than 20 years must not exceed 100 n curie (Ci)/g. The net weight of the waste (excluding the weight of the container and shielding) must be used to calculate the specific activity of the waste in each container. The following isotopes must be considered when making the transuranic waste determination: $^{237}$Np, $^{238}$Pu, $^{239}$Pu, $^{240}$Pu, $^{242}$Pu, $^{244}$Pu, $^{241}$Am, $^{242m}$Am, $^{243}$Am, $^{243}$Cm, $^{245}$Cm, $^{246}$Cm, $^{247}$Cm, $^{248}$Cm, $^{250}$Cm, $^{247}$Bk, $^{249}$Cf, $^{251}$Cf.

### *17.1.2 Radionuclide Content or Concentration*

Radionuclide concentrations must be reported in the NNSS-WP and the PSDR in accordance with the requirements listed below and Table 17-1.

**Table 17-1. Radionuclide Action Levels for Waste Characterization and Reporting**

| Nuclide | Action Level (Bq m-3) | Nuclide | Action Level (Bq m-3) |
|---|---|---|---|
| $^{3}$H | 6.2E+11 | $^{210}$Pb | 3.5E+11 |
| $^{14}$C | 5.4E+15 | $^{226}$Ra | 2.1E+07 |
| $^{26}$Al | 9.7E+07 | $^{228}$Ra | 1.7E+12 |
| $^{36}$Cl | 1.9E+08 | $^{227}$Ac | 1.7E+11 |
| $^{39}$Ar | 9.9E+20 | $^{228}$Th | 4.3E+13 |
| $^{40}$K | 9.4E+10 | $^{229}$Th | 2.8E+10 |
| $^{41}$Ca | 2.8E+12 | $^{230}$Th | 6.0E+07 |
| $^{59}$Ni | 1.7E+14 | $^{232}$Th | 8.1E+09 |
| $^{63}$Ni | 3.2E+14 | $^{231}$Pa | 1.0E+10 |
| $^{60}$Co | 1.6E+12 | $^{232}$U | 4.3E+10 |
| $^{85}$Kr | 2.0E+20 | $^{233}$U | 8.2E+10 |
| $^{90}$Sr | 4.3E+11 | $^{234}$U | 1.3E+10 |
| $^{93}$Zr | 1.1E+14 | $^{235}$U | 1.1E+11 |
| $^{93m}$Nb | 4.6E+15 | $^{236}$U | 2.8E+11 |
| $^{94}$Nb | 1.2E+10 | $^{238}$U | 3.5E+11 |
| $^{99}$Tc | 3.2E+09 | $^{237}$Np | 3.4E+10 |
| $^{107}$Pd | 2.9E+14 | $^{238}$Pu | 1.8E+12 |
| $^{113m}$Cd | 6.2E+12 | $^{239}$Pu | 5.1E+11 |
| $^{121m}$Sn | 2.1E+14 | $^{240}$Pu | 5.2E+11 |
| $^{126}$Sn | 1.1E+10 | $^{241}$Pu | 5.8E+12 |
| $^{129}$I | 3.4E+09 | $^{242}$Pu | 3.7E+11 |
| $^{133}$Ba | 5.4E+12 | $^{244}$Pu | 4.8E+10 |
| $^{135}$Cs | 2.8E+12 | $^{241}$Am | 1.7E+11 |
| $^{137}$Cs | 2.5E+11 | $^{243}$Am | 5.8E+10 |
| $^{150}$Eu | 9.4E+10 | $^{243}$Cm | 8.3E+11 |
| $^{152}$Eu | 4.7E+11 | $^{244}$Cm | 3.4E+12 |
| $^{154}$Eu | 1.7E+12 | $^{245}$Cm | 4.6E+10 |
| $^{151}$Sm | 2.4E+15 | $^{246}$Cm | 9.2E+10 |
| $^{166m}$Ho | 1.2E+10 | $^{248}$Cm | 2.9E+10 |
| $^{207}$Bi | 1.1E+11 | $^{250}$Cf | 1.5E+12 |

Radionuclides known or reasonably expected to be present in a waste stream must be reported as follows:

1. The activity concentration of the radionuclides in the final waste form exceeds 1% of the Action Levels (Table 17-1). These radionuclides require rigorous waste characterization and must be reported on the WSP and on-line WDR, which is found in the WCATS User's Manual.
2. Radionuclides that are alpha-emitting and Transuranic (TRU) with a half-life greater than 20 years and that exceed 10 pCi/g must be reported on the WSP and on-line WDR. TRU waste radionuclides with concentrations that exceed 1 nCi/g require rigorous waste-characterization methods and must be reported on the WSP and on-line WDR.
3. Activity concentrations in the final waste form that exceed 1% of the total activity concentration must be reported on the WSP and on-line WDR. The total activity concentration must include the activity of all radionuclides except for those that are exempt from the reporting requirements as specified in Table 17-2. For these radionuclides and for those present at a level less than the detection limit of industry-accepted characterization methods, Process Knowledge (PK) should be sufficient for characterization.

| **Table 17-2. Exempt Radionuclides** |
|---|
| $^{90}$Y, $^{93}$Nb, $^{126m}$Sb, $^{126}$Sb, $^{137m}$Ba |
| $^{233}$Pa, $^{225}$Ra, $^{225}$Ac, $^{221}$Fr, $^{217}$At, $^{213}$Bi, $^{213}$Po, $^{209}$Tl, $^{209}$Pb |
| $^{239}$Np, $^{231}$Th, $^{227}$Th, $^{223}$Fr, $^{223}$Ra, $^{219}$Rn, $^{215}$Po, $^{211}$Pb, $^{211}$Bi, $^{211}$Po, $^{207}$Tl |
| $^{234}$Th, $^{234m}$Pa, $^{234}$Pa, $^{222}$Rn, $^{218}$Po, $^{214}$Pb, $^{214}$Bi, $^{214}$Po, $^{210}$Bi, $^{210}$Po |
| $^{240}$U, $^{240m}$Np, $^{240}$Np, $^{228}$Ra, $^{228}$Ac, $^{228}$Th, $^{224}$Ra, $^{220}$Rn, $^{216}$Po, $^{212}$Pb, $^{212}$Bi, $^{212}$Po, $^{208}$Tl |
| ***Note:*** The progeny radionuclides listed are exempt from reporting requirements when a parent radionuclide is present. |

### *17.1.3 Hazardous Waste*

Waste regulated solely under 40 CFR, *Protection of Environment*, Parts 261–268, and State of Nevada hazardous waste regulations are not acceptable for disposal at NNSS. State of Nevada regulations require that waste regulated as "hazardous" in the state-of-generation must be regulated as hazardous when brought into the State of Nevada; therefore, unless the material is classified, such waste must not be accepted for disposal.For MLLW, See Section 17.3.

Environmental media from cleanup activities may be acceptable for disposal if:

- The New Mexico Environment Department (NMED) and/or state of origin makes a "Contained-In Determination" for LLW environmental media that was in contact with "listed" wastes. The generator must submit this determination to the National Nuclear Security Administration/Nevada Field Office (NNSA/NFO) Environmental Management Operations (EMO) Manager for evaluation, and provide and demonstrate:
  - Documentation that the waste is primarily environmental media (not debris). For the purpose of this determination, environmental media is defined as materials found in the natural environment, such as soil, ground water, surface water, and sediments, or a mixture of such liquids, sludges, or solids that are inseparable by simple mechanical removal processes.
  - Documentation that the media was representatively sampled and evaluated for total contaminant concentrations (mg/kg) and Toxicity Characteristic Leaching Procedure (TCLP) concentrations (mg/L), where applicable.
  - If the treatment standard is provided in "mg/kg" (totals), the "listed" constituents must be less than one-tenth of the concentration of the Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDRs) (40 CFR 268.40, *Applicability of Treatment Standards*). If the treatment standard is provided in "mg/l TCLP," the TCLP concentration must be less than the Safe Drinking Water Act Standard Maximum Contaminant Level.
  - Laboratory data, including quality-assurance and quality-control data.

Nevada Division of Environmental Protection (NDEP) will evaluate the state of origin "Contained-In Determination" on a case-by-case basis for concurrence and will issue written correspondence through the Nevada waste acceptance review panel process once the generator has provided and demonstrated the above-stated items. Debris contaminated with "listed" constituents will be evaluated, independent of the criteria established above for environmental media.

#### *17.1.3.a Land Disposal Restrictions*

MLLW and classified non-radioactive hazardous waste/matter must meet the LDR treatment standard requirements in Nevada Administrative Code (NAC) 444.8632, *Compliance with federal regulations adopted by reference* (incorporating 40 CFR 268.40, *Applicability of Treatment Standards* and 40 CFR 268.45, *Treatment Standards for Hazardous Debris*), including standards for Underlying Hazardous Constituents (UHCs). Waste meeting the alternative LDR treatment standard for contaminated soil, as defined by NAC 444.8632 (incorporating 40 CFR 268.49, *Alternative LDR Treatment Standards for Contaminated Soil*), is also accepted.

LDR notification/certification must be made in accordance with Section 6.3.4 of the NNSS WAC.

#### *17.1.3.b Determinations of Equivalent Technology*

MLLW and non-radioactive hazardous waste/matter that have been treated based on a Determination of Equivalent Technology (DET) will require NDEP concurrence on the DET. NDEP will require the DET documentation, including EPA regions' determinations. Any documentation of state-of-generation involvement in the DET should also be submitted.

### *17.1.4 Free Liquids*

Liquid waste and waste containing free liquids must be converted into a form that contains as little freestanding and non-corrosive liquid as is reasonably achievable. Liquid waste and waste containing free liquids should be processed to a solid form or packaged in sufficient absorbent for twice the volume of the liquids. The free liquid must not exceed 1% of the volume of the waste when the waste is in a disposal container or 0.5% of the volume of the waste processed to a solidified form. Provisions for additional absorbent should be made when significant temperature and atmospheric differences exist between the generating site and the disposal site.

Waste must be evaluated to determine its potential to release liquid during handling, storage, and transportation. High moisture content waste is defined as waste that has the potential to release moisture from its final waste form in excess of the NNSS WAC requirement. Generators must document the decision made when characterizing and determining absorbents for high-moisture-content waste; see the Nevada National Security Site Generator Work Group "*Position Paper for High Moisture Content Waste*," Revision 0, dated 11/3/1998, for guidance. The LANL Waste Certification Official must independently review and approve the absorbent determinations and use of absorbents for absorbing liquids.

#### *17.1.4.a Free Liquids (MLLW)*

Free liquids must be absorbed, stabilized, or otherwise removed from the waste. Containerized free liquids such as ampules or small articles that contain free liquids required for the article to function (e.g., batteries or capacitors), are acceptable.

#### *17.1.4.b Absorbents (MLLW)*

Absorbents must be nonbiodegradable and identified on the profile. Examples of nonbiodegradable absorbents according to 40 CFR 264.314(d), *Special Requirements for Bulk and Containerized Liquids*, and/or 40 CFR 265.314(e) include:

- Inorganic minerals, other inorganic materials and elemental carbon (e.g., aluminosilicates, clays, smectites, fuller's earth, bentonite, calcium bentonite, montmorillonite, calcined montmorillonite, kaolinite, micasillite, vermiculites, zeolites; calcium carbonate [organic free limestone], oxides/hydroxides, alumina, lime, silica sand, diatomaceous earth; perlite [volcanic glass], expanded volcanic rock; volcanic ash; cement kiln dust; fly ash; rice hull ash, activated charcoal/activated carbon).
- High molecular weight synthetic polymers (e.g., polyethylene, polypropylene, polyurethane). This does not include polymers derived from biological material or polymers specifically designed to be degradable.
- Absorbents determined to be nonbiodegradable under American Society for Testing and Materials (ASTM) Method G21-70, *Standard Practice for Determining Resistance of Synthetic Polymer Materials to Fungi*; ASTM Method G22-76, *Standard Practice for Determining Resistance of Plastics to Bacteria*; or OWCS Test 301B, *$CO_2$ Evolution*.

### *17.1.5 Particulates*

Fine particulate wastes must be immobilized so that the waste package contains no more than 1 weight percent of less-than-10-micrometer-diameter particles or 15 weight percent of less-than-200-micrometer-diameter particles. Waste that is known to be in a fine particulate form or in a form that could mechanically or chemically be transformed to a particulate during handling and interim storage must be immobilized.

Secure packaging may be used in place of immobilization. The following are examples of acceptable packaging: steel boxes, and drums with a sealed 6-mil or equivalent liner. Disposal containers with contents individually wrapped and sealed in plastic, and over-pack containers are acceptable.

### *17.1.6 Gases*

Waste gases must be packaged at a pressure that does not exceed 1.5 atm absolute at 20°C. Compressed gases as defined by 49 CFR, *Transportation,* must not be accepted. Examples of compliance methods include puncturing aerosol cans and removing the valve mechanism from expended gas cylinders.

### *17.1.7 Stabilization*

Where practical, waste must be treated to reduce volume and provide a more stable waste form. Wastes must not react with other wastes or the packaging during storage, shipping, handling, and disposal.

Structural stability can be accomplished by crushing, shredding, or placing a smaller piece inside an opening of a larger piece, such as nesting pipes.

Chemical stability and compatibility must be demonstrated to ensure that no reactions occur and that significant quantities of harmful gases, vapors, or liquids are not generated (specifically when different waste forms are combined in a single waste container.)

#### *17.1.7.a Compatibility*

Incompatible wastes, or incompatible wastes and materials, must not be placed in the same container if such placement:

- Generates extreme heat or pressure, fire or explosion, or violent reaction;
- Produces uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health;
- Produces uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;
- Damages the structural integrity of the device or facility containing the waste; or
- Through other like means threatens human health or the environment.

### *17.1.8 Etiologic Agents*

Waste containing pathogens, infectious wastes, or other etiologic agents as defined in 49 CFR, *Transportation* must not be accepted.

### *17.1.9 Chelating Agents*

Waste packages containing chelating or complexing agents in amounts greater than 1 percent by volume of the waste must not be accepted unless stabilized or solidified.

### *17.1.10 Polychlorinated Biphenyls (PCBs)*

Waste containing PCBs that meet the requirements for disposal in a solid waste or permitted hazardous waste landfill as specified in 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions,* and NAC 444.9452, *Adoption by reference of certain federal regulations (NNSS WAC)*, must be accepted for disposal at NNSS.

- PCB-contaminated waste must be packaged, marked, and labeled in accordance with the requirements of 40 CFR, *Protection of Environment*, and 49 CFR, *Transportation* and meet the applicable shipping requirements for the radioactive content of the package. Waste containing PCBs that meet the requirements for disposal in a permitted hazardous waste landfill must be segregated and profiled into a separate waste stream and packaged and shipped under different shipment numbers than other waste streams. These types of PCB wastes must also meet the following requirements:
  - Free liquids must be absorbed, stabilized, or otherwise removed from the waste. Containerized free liquids such as ampules, small articles that contain free liquids required for the article to function (e.g., batteries or capacitors), are acceptable.
  - Absorbents must be non-biodegradable and identified on the WSP.
  - Containers must be at least 90% full.
  - Incompatible wastes, or incompatible wastes and materials, must not be placed in the same container if such placement:
    - generates extreme heat or pressure, fire or explosion, or violent reaction;
    - produces uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health;
    - produces uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;
    - damages the structural integrity of the device or facility containing the waste, or
    - through other like means threaten human health or the environment.

In accordance with the NNSS WAC, Waste Management-Services (WM-SVS) must provide written notice a minimum of 15 days in advance of the first shipment of each waste stream containing PCB remediation waste or bulk product waste. The notice must be faxed to the Radioactive Waste Management Complex (RWMC) by the LANL WCO/Alternate WCO and should contain information specified in 40 CFR 761.61, *PCB Remediation Waste*, for PCB remediation waste and/or 40 CFR 761.62, *Disposal of PCB Bulk Product Waste*, for PCB bulk product waste.

Generators must provide written notice, a minimum of 15 days in advance of the first shipment of each waste stream containing PCB remediation waste or bulk product waste. The notice must be submitted to the RWMC by the LANL WCO/Alternate WCO and should contain information specified in 40 CFR 761.61 for PCB remediation waste and/or 40 CFR 761.62 for PCB bulk product waste.

### *17.1.11 Explosives*

Waste containing un-reacted explosives must not be accepted at the NNSS. Such waste may have RCRA characteristics and must be treated to meet Land Disposal Restrictions (LDRs) before being acceptable for disposal at the NNSS.

### *17.1.12 Pyrophorics*

Pyrophoric materials contained in the waste must be treated, prepared, and packaged to be nonflammable. Pyrophoric materials that are blended in a hardened concrete matrix are considered to be treated to be nonflammable.

### *17.1.13 Sealed Sources*

Sources containing TRU nuclides must be evaluated individually against the TRU criteria in Section 17.1.1 of this attachment, considering only the mass of the source and any component integral to the source. The source must be used to determine the activity concentration (nCi/g) for reporting on the waste profile.

Sealed sources that have an activity of less than 3.7 MBq (100 μCi) can be a component of waste streams, such as contaminated trash. The total volume of the waste can be used for waste classification and for determination of the radionuclide concentration. Characterization of non-TRU sources (i.e., less than 3.7 MBq [100 μCi]) on an individual source basis is not required, provided the characterization method used is adequate to ensure compliance with the radionuclide reporting criteria.

Sealed sources that have an activity of 3.7 MBq (100 μCi) or greater must be segregated from other waste, grouped together, and profiled as a separate waste stream. These sealed sources must be characterized on an individual basis using the volume or mass of the source to determine the radionuclide concentration. Sealed sources that have an activity of less than 3.7 MBq can either be a component of other waste streams or included with sealed sources that have an activity of 3.7 MBq or greater. In completing the NNSS-WP for sealed sources, the radionuclide activity concentration (Bq/m$^3$) reported in Section D.5 of the NNSS-WP is the activity of each radionuclide in the disposal package divided over the volume of the waste package. During the profile approval process, RWAP may request an inventory list of the sources covered by the NNSS-WP.

The following are specific items related to sealed sources:

- Stabilization: Sealed sources may need to be stabilized in the shipping/disposal container to ensure that dose rates remain the same during transport (e.g., stabilization using concrete to ensure sources do not shift during transport).

- Lead shielding: Lead used as shielding that either is integral or external to the sealed source and that is used to reduce radiation exposure is acceptable as LLW. This includes lead that if removed would cause undue or excessive radiation exposure to workers.
- Smoke detectors: In determining the transuranic activity concentration for sources in smoke detectors, the activity is divided over the mass of the entire smoke detector.

The requirements found in Section 17.2.4, must be followed if new packaging with lead shielding is used.

The *Position Paper on the Proper Characterization and Disposal of Sealed Radioactive Sources* is no longer a requirements document and is for information only.

If the source does not meet the above requirements, contact the LANL NNSS WCO for further guidance.

### *17.1.14 Low-Level Waste (LLW) Containing Regulated Asbestos*

Regulated Asbestos Low Level Waste (RALLW) is any LLW containing friable asbestos material; Category I non-friable Asbestos Containing Material (ACM) that has become friable; Category I non-friable ACM that will be or has been subject to sanding, grinding, cutting, or abrading; or Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder.

RALLW must be packaged, marked, and labeled in accordance with the requirements of 40 CFR, *Protection of Environment*, State of Nevada solid waste disposal site permit (SW 532, current revision), and state of generation regulations. Packages containing RALLW must meet the applicable shipping requirements for the radioactive content of the package. RALLW must be wetted with a water and surfactant mixture and packaged in a plastic bag that is not less than 6 mil in thickness, a combination of plastic bags that equal at least 6 mil in thickness, or a container that is lined with plastic. RALLW must not be packaged in an intermodal (roll-off box) container.

If free liquid is present, an absorbent must be added to ensure that the waste meets the requirements of Section 17.1.4 of this attachment. Sharp edges and corners must be padded or protected to prevent damage to the plastic bag during handling, shipping, and disposal.

Each container used for the disposal of RALLW must be labeled with one of the statements below.

<table>
<tr><td colspan="2">(1) CAUTION<br>CONTAINS ASBESTOS FIBERS<br>AVOID OPENING OR BREAKING CONTAINER<br>BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH</td></tr>
<tr><td>(2) CAUTION CONTAINS ASBESTOS FIBERS AVOID CREATING DUST MAY CAUSE SERIOUS BODILY HARM</td><td>(3) DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD</td></tr>
</table>

RALLW must be profiled and segregated into a separate waste stream. Because of Nevada state notification requirements and disposal cell capacity, RALLW must be packaged and shipped under different shipment numbers separately from other waste streams. A preshipment notification must be faxed by WM-SVS to NNSA/NFO at least seven days before shipment arrival.

RALLW must not be packaged into soft-sided containers as the only containment.

The PSDR for asbestos shipments must be uploaded 24 hours in advance of shipment arrival at NNSS. The comment section must denote “asbestos.”

### *17.1.15 Radioactive Animal Carcasses*

Animal carcasses containing, or contained in, radioactive materials must be packaged with the biological material layered with lime and placed in a metal container meeting applicable requirements. If the resultant waste matrix is capable of gas generation, the container must be vented with a carbon composite High-Efficiency Particulate Air (HEPA) filtration device. NNSA/NFO may require analysis of the waste decomposition gases. Animal carcasses preserved with formaldehyde must not be accepted for disposal.

### *17.1.16 Beryllium Waste*

Beryllium is defined as elemental beryllium and any insoluble beryllium compound or alloy containing 0.1 or higher percent beryllium that may be released as an air-borne particulate. Beryllium-containing waste and beryllium-contaminated equipment must be packaged in sealed, impermeable bags (minimum 6-mil thickness), containers, or enclosure to prevent the release of beryllium dust during handling and transportation. Particulate beryllium waste must not be packaged in an intermodal (roll-off box) container. The bags, containers, and enclosures must be labeled with the following information..

| |
|---|
| “DANGER, CONTAMINATED WITH BERYLLIUM<br><br>DO NOT REMOVE DUST BY BLOWING OR SHAKING<br><br>CANCER AND LUNG DISEASE HAZARD” |

### *17.1.17 Classified Waste*

Generators are responsible for ensuring requirements of DOE O 471.6, *Information Security*, or the NNSA Policy Letter NAP-70.4, *Information Security*, are satisfied for permanent burial of classified waste/matter at NNSS. Generators must submit a signed DOE or NNSA Security Authorization for permanent burial without sanitization with their classified NNSS-WP. This approval does not replace or eliminate the Material Control and Accountability requirements of Section 6.3.1 of the NNSS WAC.

Weapons components described as pits, canned subassemblies, neutron generators, or detonators will not be accepted unless demilitarization has been performed.

Classified waste/matter (LLW, MLLW, non-radioactive, and non-radioactive hazardous) must be profiled and segregated into a separate waste stream and have different shipment numbers from other waste streams. Generators shipping classified waste that requires protection from visual observation must submit the Advance Shipment Notification Form, identified in Appendix C.4 of the NNSS WAC, to the RWMC at least seven days before shipment arrival. This form must be provided by the LANL WCO for classified waste/matter.

Generators that intend to ship classified matter to the NNSS, in anticipation of a further waste determination and disposal, in accordance with 40 CFR 266 Subpart M, *Military Munitions* must declare this intent to the LANL WCO. If classified matter is managed in accordance with RCRA, the generator must check the appropriate box in B.5 on the profile sheet and follow the mixed waste requirements in this document.

Generators that ship classified matter to the NNSS for permanent burial must work with the LANL WCO or e-mail wco@lanl.gov to provide the information to complete the Bill of Lading or the NSTec Classified Matter Hazardous Material Shipping Document as required by NNSS. Commercial Treatment Facilities that treat classified matter must ship this waste to the NNSS RWMC using a Uniform Hazardous Waste Manifest as provided with LANL waste shipping documentation.

If the generator elects to treat classified matter on-site or provide a justification for Macroencapsulation Equivalency (see Section 3.3.4.2 of the NNSS WAC), the generator must follow the requirements outlined above. The generator must also provide an LDR certification with the shipment.

Following cradle-to-grave tracking is important and is a generator responsibility. The NNSS RWMC will provide a certificate of disposal to the generator or treatment facility, as appropriate.

#### *17.1.18 Petroleum Hydrocarbon Burdened LLW*

Petroleum hydrocarbon burdened LLW is only regulated when generated within the state of Nevada. Petroleum hydrocarbon burdened LLW soil and closely related construction and demolition debris, greater than 100 mg/kg Total Petroleum Hydrocarbons (TPH), resulting from a petroleum release generated by NNSA/NFO Operations will be disposed at the RWMC. The concentration level of TPH is measured using U.S. EPA Method 8015, as modified.

NNSS-generated hydrocarbon waste must be packaged separately from other LLW, the containers identified as “HYDROCARBON WASTE” near the bar code labels, and shipped under separate shipping documents (Bill of Lading, Shipping Manifest, Package Shipment Disposal Request, Certification Statement, etc.).

### 17.2 Waste Package Criteria

Waste packages must meet applicable DOE Orders, and 10 CFR, *Energy*, 40 CFR, *Protection of Environment,* and 49 CFR, *Transportation,* requirements (i.e., design, nuclear safety, radiation levels, activity limits, nuclear heating, and multiple hazards). Waste packages must be capable of withstanding stress associated with loading, handling, stacking, and shipping. External contamination levels for waste packages and transport vehicles must meet the release limits specified in 10 CFR 835, *Occupational Radiation Protection*, Appendix D, *Surface Contamination Values*.

Only packages procured through the LANL Waste Certification Official WCO will be acceptable for disposal at NNSS. Generators must notify the WCO at least two months in advance of package needs to allow time for package orders. Contact the WCO for a list of approved packages.

### *17.2.1 Nuclear Criticality Safety*

The quantity of fissile (fissionable) material in a waste package must be limited so that an infinite array of such packages will be subcritical under "as packaged" conditions and if the array were to be flooded with water to any credible degree. Waste packages must comply with the fissile material limits in Appendix E of the NNSS WAC. Compliance of a waste package with the fissile material limits is required to be documented in the NNSS-WP. Material in a waste package acceptable for disposal must be demonstrated to meet any of the following:

- Meets criteria specified in 49 CFR 173.453 *Shippers—General Requirements for Shipments and Packagings—Fissile materials – exceptions*. Does not exceed 350 g of $^{235}$U Fissile Gram Equivalent (FGE) per package, nor does it exceed 2 g of $^{235}$U FGE per kilogram of waste (mass of the package is not included in the mass of the waste). Graphite and beryllium must not exceed 1% by mass of the waste. FGE is determined by completing Table 17-3, *Calculation of $^{235}$U Fissile Gram Equivalence and Effective $^{235}$U Enrichment for LLW Packages*. Both limits ***must*** not be exceeded. These criteria apply to 55-gallon metal drums or larger containers (i.e. 85-gallon drums, 4 ft. × 4 ft. × 6 ft. metal boxes) and are not applicable to drums less than 55-gallon or soft sided, wood, or plastic containers.
- Does not exceed the limits and the waste package meets the conditions as specified in
  - Table 17-4, *Allowable Package Fissile Loading for Various Package Steel Weights*;
- Does not exceed the limits and the waste package meets the conditions as specified in
  - Table 17-5, *Criticality Safety Restrictions for the Use of the Fissile Limits in Table 17-6*; and
  - Table 17-6, *Maximum Grams of $^{235}$U as a Function of Enrichment*.

***Note:*** Waste containing uranium with an enrichment of less than 0.90% $^{235}$U by weight and those nuclides listed in Table 17-3 so that their FGE is 1% or less of the grams of $^{235}$U, does not provide a fissile material concern.

If the waste does not comply with any of the above, then a waste-specific Nuclear Criticality Safety Evaluation (NCSE) may be necessary for acceptance of the waste. The LANL WCO will contact the NNSA/NFO RWAP Manager for further information on the criteria for performing an NCSE for LANL waste issues.

- If the waste stream contains enriched uranium ($^{235}$U weight percent >0.90), $^{233}$U, $^{239}$Pu, $^{241}$Pu, $^{242m}$AM, $^{243}$Cm, $^{245}$Cm, $^{247}$Cm, $^{249}$Cf, or $^{251}$Cf, the $^{235}$U FGE and $^{235}$U effective enrichment is required to be reported with the profile by completing Table 17-3. The waste must not exceed the total FGE as specified for the effective enrichment.

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**Attachment 17. Waste Acceptance at the Nevada National Security Site (NNSS) (Cont.)**
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**Table 17-3. Calculation of $^{235}$U Fissile Gram Equivalence and Effective $^{235}$U Enrichment for LLW Packages**

| Nuclide (A) | High Activity Conc. (Bq/m$^3$) (B) | Volume of Package (m$^3$) (C) | Activity (Bq) (D) | Specific Activity (Bq/g) (E) | Mass of Nuclide (g) (D/E=F) | $^{235}$U FGE Factors (G) | $^{235}$U FGE (F×G=H) | If FGE is >1% of $^{235}$U Mass, then include (I) |
|---|---|---|---|---|---|---|---|---|
| $^{233}$U | | | | 3.6E+08 | | 1.4E+00 | | |
| $^{235}$U | | | | 8.1E+04 | | 1.0E+00 | | |
| $^{239}$Pu | | | | 2.3E+09 | | 1.6E+00 | | |
| $^{241}$Pu | | | | 3.8E+12 | | 3.5E+00 | | |
| $^{242m}$Am | | | | 3.6E+11 | | 5.4E+01 | | |
| $^{243}$Cm | | | | 1.9E+12 | | 7.8E+00 | | |
| $^{245}$Cm | | | | 6.4E+09 | | 2.3E+01 | | |
| $^{247}$Cm | | | | 3.5E+06 | | 7.8E–01 | | |
| $^{249}$Cf | | | | 1.5E+11 | | 7.0E+01 | | |
| $^{251}$Cf | | | | 5.9E+10 | | 1.4E+02 | | |
| Effective $^{235}$U Enrichment = $\frac{\text{Total } ^{235}\text{U FGE}}{\text{Total U}}$ | | | | | | | Total $^{235}$U FGE | |
| Effective $^{235}$U Enrichment = | | | | | | | | |

Instructions for completing Table 17-3:

1. Multiply high activity range of the waste stream (Bq/m$^3$) by volume of waste to determine the maximum activity that could be present in a waste package for the nuclides listed above, resulting in Bq (Column D). For $^{235}$U, the activity is required to be included only if the $^{235}$U enrichment is equal to or greater than 0.90% by weight of total U.
2. Divide activity (Bq) (Column D) by the specific activity of the nuclide (Bq/g) (Column E) to determine the mass of the nuclide (Column F).
3. Multiply the mass (g) (Column F) of each nuclide by the $^{235}$U Fissile Gram Equivalent (FGE) factor (Column G) to determine FGE (Column H).
4. If the FGE value is greater than 1% of the $^{235}$U mass, then include in Column I to determine the total $^{235}$U FGE for a waste package.
5. Effective $^{235}$U enrichment (weight %) is calculated by dividing the total $^{235}$U FGE by the total mass (g) of uranium and multiplying by 100.

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**Attachment 17. Waste Acceptance at the Nevada National Security Site (NNSS) (Cont.)**
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**Table 17-4. Allowable Package Fissile Loading for Various Package Steel Weights**

| $^{235}$U Enrichment Weight % | Maximum Grams of $^{235}$U per Package | | | |
|---|---|---|---|---|
| | 35 Pounds (16 kg) Steel | 50 Pounds (23 kg) Steel | 70 Pounds (32 kg) Steel | 105 Pounds (48 kg) Steel |
| 80-100 | 54 | 66 | 82 | 103 |
| 60-80 | 55 | 67 | 83 | 105 |
| 40-60 | 56 | 68 | 85 | 107 |
| 20-40 | 60 | 73 | 90 | 110 |
| 15-20 | 65 | 78 | 95 | 120 |
| 10-15 | 70 | 83 | 100 | 130 |
| 8-10 | 75 | 90 | 110 | 140 |
| 7-8 | 80 | 97 | 120 | 150 |
| 6-7 | 85 | 104 | 130 | 160 |
| 5-6 | 90 | 109 | 135 | 170 |
| 4.5-5.0 | 100 | 121 | 150 | 190 |
| 4.0-4.5 | 105 | 129 | 160 | 200 |
| 3.5-4.0 | 110 | 136 | 170 | 210 |
| 3.0-3.5 | 120 | 146 | 180 | 230 |
| 2.5-3.0 | 140 | 170 | 210 | 270 |
| 2.0-2.5 | 170 | 209 | 260 | 330 |
| 1.9-2.0 | 220 | 271 | 340 | 440 |
| 1.8-1.9 | 240 | 296 | 370 | 480 |
| 1.7-1.8 | 260 | 324 | 410 | 530 |
| 1.6-1.7 | 290 | 363 | 460 | 590 |
| 1.5-1.6 | 330 | 411 | 520 | 670 |
| 1.4-1.5 | 380 | 479 | 610 | 790 |
| 1.3-1.4 | 460 | 580 | 740 | 960 |
| 1.25-1.3 | 580 | 739 | 950 | 1,250 |
| 1.20-1.25 | 670 | 854 | 1,100 | 1,460 |
| 1.15-1.20 | 780 | 1,003 | 1,300 | 1,700 |
| 1.10-1.15 | 950 | 1,220 | 1,580 | 2,100 |
| 1.07-1.10 | 1,150 | 1,514 | 2,000 | 2,700 |
| 1.04-1.07 | 1,400 | 1,829 | 2,400 | 3,200 |
| 1.02-1.04 | 1,700 | 2,214 | 2,900 | 4,000 |

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**Table 17-4. Allowable Package Fissile Loading for Various Package Steel Weights (Cont.)**

| U-235 Enrichment Weight % | Maximum Grams of U-235 per Package | | | |
|---|---|---|---|---|
| | 35 Pounds (16 kg) Steel | 50 Pounds (23 kg) Steel | 70 Pounds (32 kg) Steel | 105 Pounds (48 kg) Steel |
| 1.00-1.02 | 2,000 | 2,643 | 3,500 | 4,800 |
| 0.99-1.00 | 2,350 | 3,143 | 4,200 | 5,800 |
| 0.98-0.99 | 2,600 | 3,500 | 4,700 | 6,500 |
| 0.97-0.98 | 3,000 | 4,029 | 5,400 | 7,600 |
| 0.96-0.97 | 3,400 | 4,600 | 6,200 | 8,500 |
| 0.95-0.96 | 3,800 | 5,171 | 7,000 | 10,000 |
| <0.95 | 4,400 | 5,943 | 8,000 | Unlimited |

Instructions for using Table 17-4:

1. For Low-Level Waste (LLW) that has enrichment exactly at the boundary between two enrichment ranges, the larger fissile mass loading may be used.
2. Linear interpolations between steel weights are allowed. For steel weights in excess of 105 lb. (48 kg.); use the fissile mass for 105 lb (48 kg); do not extrapolate to a larger fissile mass.
3. Table 17-4 is not acceptable for LLW containing more than 1 percent beryllium and carbon graphite by package weight.
4. For waste with nuclides found in Table 17-3 (other than $^{235}U$) such that their Fissile Gram Equivalent (FGE) exceeds 1 percent of the grams of $^{235}U$ present in the waste, then these nuclides must be accounted for. To account for these nuclides, an effective enrichment must be calculated as: ($^{235}U$ grams + FGE) divided by Total U and multiplied by 100 percent. The effective enrichment and the sum of the total $^{235}U$ FGE are determined by completing Table 17-3, and they are used to verify compliance with Table 17-4.
5. The total weight of steel in a package may include that of all inner drums such as 10-, 15-, and 30-gallon drums inside of a 55-gallon drum, and the outer drum.
6. Mixing drums in an overpack, such as commingling 15-, 30-, and 55-gallons drums in a 4'x4'x7' box, is acceptable as long as the individual drums comply with the Table 17-4 limits.

LLW packages meeting the restrictions specified in Table 17-5 and the fissile limits in Table 17-6 satisfy the criticality safety criteria specified in Section 17.2.1.

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| **Table 17-5. Criticality Safety Restrictions for the Use of the Fissile Limits in Table 17-6** | |
|---|---|
| Volume of overpack, if used | >nominal 55-gal. (outermost container) |
| Volume of waste container | 55-gal. drum (may contain inner drums such as a 10-gal. container inside a 30-gal. drum, both within the 55-gal. outer drum) |
| Space between 55-gal. drum (waste container) and inner containers | If filled, the material must be loose, pourable material (e.g., vermiculite) |
| Boron location | Boron must be inside 55-gal. drum |
| Boron physical properties (natural) | Approx. = 20 atom% $^{10}B$, Approx.= 80 atom% $^{11}B$ |
| Boron Weight<br>Note: For example, 12.9 kg of $B_2O_3$ is required to have 4 kg of boron | ≥ nominal 9 pounds (4 kg)<br>Note: the form is not controlled (e.g., boraxo, $B_4C$, and borosilicate glass are all acceptable, but it must be loose and pourable). |
| Beryllium and graphite by package weight | ≤1% by weight |
| Maximum hydrogen content of waste as packed and as received at the Nevada National Security Site (NNSS) | Hydrogen to $^{235}U$ atom ratio (H/X) must be less than 50.<br>For example, this limit is equivalent to a water-to-$^{235}U$ mass ratio of all hydrogenous materials, such as plastics and cellulose, may be assumed to be water to determine an equivalent water mass. That is, 1 g plastics = 1 g water. |
| Packaging (drum) material and mass | No restrictions |
| $^{235}U$ limits per package | The values presented in Table 17-6 |

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**Table 17-6. Maximum Grams of $^{235}U$ as a Function of Enrichment**

| $^{235}U$ Enrichment (Weight %) | $^{235}U$ (g) | $^{235}U$ Enrichment (Weight %) | $^{235}U$ (g) |
|---|---|---|---|
| 0.95 | 9,000 | 2.50 | 1,810 |
| 0.96 | 8,900 | 3.00 | 1,650 |
| 0.97 | 8,800 | 3.50 | 1,554 |
| 0.98 | 8,700 | 4.00 | 1,485 |
| 0.99 | 8,357 | 4.50 | 1,436 |
| 1.00 | 7,800 | 5.00 | 1,400 |
| 1.02 | 7,195 | 6.00 | 1,225 |
| 1.04 | 6,580 | 7.00 | 1,179 |
| 1.07 | 5,860 | 8.00 | 1,125 |
| 1.10 | 5,200 | 9.00 | 1,072 |
| 1.15 | 4,400 | 10.00 | 1,028 |
| 1.20 | 3,840 | 15.00 | 929 |
| 1.25 | 3,500 | 20.00 | 873 |
| 1.30 | 3,225 | 30.00 | 814 |
| 1.40 | 2,895 | 40.00 | 776 |
| 1.50 | 2,650 | 50.00 | 743 |
| 1.60 | 2,460 | 60.00 | 720 |
| 1.70 | 2,335 | 70.00 | 715 |
| 1.80 | 2,215 | 80.00 | 700 |
| 1.90 | 2,135 | 90.00 | 690 |
| 2.00 | 2,060 | 100.00 | 680 |

Instructions for using Table 17-6:

1. For waste with nuclides found in Table 17-3 (other than $^{235}U$) such that their Fissile Gram Equivalent (FGE) exceeds 1 percent of the grams of $^{235}U$ present in the waste, then these nuclides must be accounted for. To account for these nuclides, an effective enrichment must be calculated as ($^{235}U$ + FGE) divided by Total U and multiplied by 100 percent. The total $^{235}U$ FGE and effective $^{235}U$ enrichment are determined by completing Table 17-3 and they are used to verify compliance with Table 17-6.

### *17.2.2 Package Activity Limitations*

Package activity limits at the NNSS are based on $^{239}$Pu gram equivalents. The total PE-g for either a waste package or a shipment must be calculated by multiplying the activity of each radionuclide by the PE-g conversion factor (see Table 17-7) and then adding each radionuclide PE-g.

The PE-g limit for all waste packages (e.g., drums, boxes, soft-sides packages, bulk or waste objects) is 300 PE-g total, except for DOT specification 7A, Type A, or if the generator can provide documentation for DOT specification 7A, Type A equivalence, where the allowable PE-g limit per package is 12,000 PE-g. DOT Type B Certificate of Compliance (CoC) packages have no PE-g limit as long as the DOT Type B container is also the disposal container. DOT specification 7A, Type A certification/equivalence, and DOT Type B certification must be provided with profile submittal. Any shipment that has a package that exceeds the PE-g package limit will be refused for disposal.

The PE-g limit for a shipment (sum of all the packages) is 2000 PE-g total. For waste shipments that contain only DOT specification 7A, Type A package(s), or if the generator can provide documentation for DOT specification 7A, Type A equivalence, the allowable PE-g limit per shipment is 60,000 PE-g. Waste shipments that contain only DOT Type B CoC container(s) have no PE-g limit as long as the DOT Type B container is also the disposal container. Any shipment that exceeds the shipment limit will be refused for disposal.

For reference purposes, DOT specification 7A, Type A or equivalent package(s) cannot be lifted higher than nominally 12–15 feet above ground at the NNSS RWMC.

### *17.2.3 Closure*

Waste package closures must be designed to ensure they will withstand the effects of changing temperatures, weather, pressures, and/or vibrations under normal handling and shipping conditions and not breach or lose the package contents.

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**Table 17-7. Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors***

****Note:*** For isotopes not having a direct PE-g conversion factor, the total activity must be treated as Pu-239 for alpha emission and as Cs-137 for beta/gamma emission.

| Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq |
|---|---|---|---|---|---|
| Ac-224 | 3.31E-12 | Au-194 | 6.70E-15 | Br-80 | 2.84E-16 |
| Ac-225 | 2.33E-10 | Au-195 | 4.82E-14 | Br-80m | 2.28E-15 |
| Ac-226 | 3.54E-11 | Au-198 | 2.36E-14 | Br-82 | 1.83E-14 |
| Ac-227 | 4.28E-09 | Au-198m | 5.34E-14 | Br-83 | 1.45E-15 |
| Ac-228 | 4.01E-13 | Au-199 | 2.17E-14 | Br-84 | 1.06E-15 |
| Ag-102 | 4.92E-16 | Au-200 | 9.66E-16 | C-11 | 5.08E-16 |
| Ag-103 | 7.51E-16 | Au-200m | 2.01E-14 | C-14 | 1.58E-13 |
| Ag-104 | 1.03E-15 | Au-201 | 4.86E-16 | Ca-41 | 4.98E-15 |
| Ag-104m | 7.04E-16 | Ba-126 | 2.93E-15 | Ca-45 | 1.00E-13 |
| Ag-105 | 2.25E-14 | Ba-128 | 3.74E-14 | Ca-47 | 5.80E-14 |
| Ag-106 | 4.27E-16 | Ba-131 | 2.38E-14 | Cd-104 | 9.66E-16 |
| Ag-106m | 3.09E-14 | Ba-131m | 2.14E-16 | Cd-107 | 2.30E-15 |
| Ag-108m | 1.04E-12 | Ba-133 | 2.83E-13 | Cd-109 | 2.24E-13 |
| Ag-110m | 3.40E-13 | Ba-133m | 1.27E-14 | Cd-113 | 3.29E-12 |
| Ag-111 | 4.74E-14 | Ba-135m | 9.88E-15 | Cd-113m | 3.02E-12 |
| Ag-112 | 4.79E-15 | Ba-139 | 1.61E-15 | Cd-115 | 2.95E-14 |
| Ag-115 | 7.95E-16 | Ba-140 | 1.61E-13 | Cd-115m | 2.10E-13 |
| Al-26 | 3.00E-12 | Ba-141 | 9.36E-16 | Cd-117 | 4.70E-15 |
| Am-237 | 7.18E-16 | Ba-142 | 6.03E-16 | Cd-117m | 5.71E-15 |
| Am-238 | 5.18E-15 | Be-7 | 1.52E-15 | Ce-134 | 3.71E-14 |
| Am-239 | 6.52E-15 | Be-10 | 9.51E-13 | Ce-135 | 1.39E-14 |
| Am-240 | 1.19E-14 | Bi-200 | 9.59E-16 | Ce-137 | 2.88E-16 |
| Am-241 | 2.65E-09 | Bi-201 | 1.92E-15 | Ce-137m | 1.22E-14 |
| Am-242 | 5.42E-13 | Bi-202 | 1.58E-15 | Ce-139 | 5.28E-14 |
| Am-242m | 2.53E-09 | Bi-203 | 7.73E-15 | Ce-141 | 1.03E-13 |
| Am-243 | 2.63E-09 | Bi-205 | 2.91E-14 | Ce-143 | 2.29E-14 |
| Am-244 | 1.02E-13 | Bi-206 | 5.06E-14 | Ce-144 | 1.45E-12 |
| Am-244m | 4.42E-15 | Bi-207 | 1.07E-12 | Cf-244 | 3.91E-13 |
| Am-245 | 1.55E-15 | Bi-210 | 3.65E-12 | Cf-246 | 1.38E-11 |
| Am-246 | 1.91E-15 | Bi-210m | 2.72E-10 | Cf-248 | 3.10E-10 |
| Am-246m | 6.46E-16 | Bi-212 | 9.14E-13 | Cf-249 | 4.61E-09 |
| As-69 | 6.06E-16 | Bi-213 | 8.77E-13 | Cf-250 | 2.02E-09 |
| As-70 | 1.92E-15 | Bi-214 | 4.23E-13 | Cf-251 | 4.70E-09 |
| As-71 | 1.10E-14 | Bk-245 | 6.20E-14 | Cf-252 | 5.50E-10 |
| As-72 | 2.61E-14 | Bk-246 | 9.21E-15 | Cf-253 | 4.44E-11 |
| As-73 | 3.72E-14 | Bk-247 | 4.59E-09 | Cf-254 | 1.13E-09 |
| As-74 | 6.89E-14 | Bk-249 | 1.11E-11 | Cl-36 | 1.04E-12 |
| As-76 | 2.16E-14 | Bk-250 | 5.74E-14 | Cl-38 | 1.30E-15 |
| As-77 | 1.18E-14 | Br-74 | 1.09E-15 | Cl-39 | 1.34E-15 |
| As-78 | 2.57E-15 | Br-74m | 1.77E-15 | Cm-238 | 1.22E-13 |
| At-207 | 7.04E-14 | Br-75 | 1.56E-15 | Cm-240 | 9.59E-11 |
| At-211 | 3.27E-12 | Br-76 | 1.20E-14 | Cm-241 | 1.03E-12 |
| Au-193 | 3.28E-15 | Br-77 | 2.42E-15 | | |

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**Table 17-7. Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors* (Cont.)**

**Note:* For isotopes not having a direct PE-g conversion factor, the total activity must be treated as Pu-239 for alpha emission and as Cs-137 for beta/gamma emission.

| Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq |
|---|---|---|---|---|---|
| Cm-242 | 1.63E-10 | Es-254 | 2.79E-10 | Ge-77 | 1.08E-14 |
| Cm-243 | 1.91E-09 | Es-254m | 1.42E-11 | Ge-78 | 2.78E-15 |
| Cm-244 | 1.57E-09 | Eu-145 | 1.58E-14 | H-3 | 7.21E-15 |
| Cm-245 | 2.71E-09 | Eu-146 | 2.28E-14 | Hf-170 | 9.44E-15 |
| Cm-246 | 2.68E-09 | Eu-147 | 3.23E-14 | Hf-172 | 8.92E-13 |
| Cm-247 | 2.47E-09 | Eu-148 | 9.74E-14 | Hf-173 | 4.82E-15 |
| Cm-248 | 9.90E-09 | Eu-149 | 9.88E-15 | Hf-175 | 3.92E-14 |
| Cm-249 | 1.11E-15 | Eu-150 hr | 5.63E-15 | Hf-177m | 2.60E-15 |
| Co-55 | 1.47E-14 | Eu-150 yr | 3.46E-12 | Hf-178m | 7.30E-12 |
| Co-56 | 1.86E-13 | Eu-152 | 2.57E-12 | Hf-179m | 1.21E-13 |
| Co-57 | 2.75E-14 | Eu-152m | 5.99E-15 | Hf-180m | 3.90E-15 |
| Co-58 | 5.82E-14 | Eu-154 | 3.04E-12 | Hf-181 | 1.63E-13 |
| Co-58m | 4.59E-16 | Eu-155 | 3.44E-13 | Hf-182 | 8.47E-12 |
| Co-60 | 8.47E-13 | Eu-156 | 1.06E-13 | Hf-182m | 1.35E-15 |
| Co-60m | 3.81E-17 | Eu-157 | 8.55E-15 | Hf-183 | 1.72E-15 |
| Co-61 | 1.40E-15 | Eu-158 | 1.35E-15 | Hf-184 | 9.74E-15 |
| Co-62m | 5.69E-16 | F-18 | 1.62E-15 | Hg-193 | 2.21E-15 |
| Cr-48 | 6.08E-15 | Fe-52 | 1.75E-14 | Hg-193m | 7.51E-15 |
| Cr-49 | 9.66E-16 | Fe-55 | 2.15E-14 | Hg-194 | 6.53E-13 |
| Cr-51 | 1.02E-15 | Fe-59 | 1.11E-13 | Hg-195 | 2.21E-15 |
| Cs-125 | 5.45E-16 | Fe-60 | 7.73E-12 | Hg-195m | 1.61E-14 |
| Cs-127 | 1.06E-15 | Fm-252 | 9.66E-12 | Hg-197 | 9.29E-15 |
| Cs-129 | 2.13E-15 | Fm-253 | 1.26E-11 | Hg-197m | 1.61E-14 |
| Cs-130 | 3.87E-16 | Fm-254 | 1.81E-12 | Hg-199m | 9.29E-16 |
| Cs-131 | 1.31E-15 | Fm-255 | 8.10E-12 | Hg-203 | 8.03E-14 |
| Cs-132 | 8.40E-15 | Fm-257 | 2.27E-10 | Ho-155 | 5.88E-16 |
| Cs-134 | 5.61E-13 | Fr-222 | 7.65E-13 | Ho-157 | 1.23E-16 |
| Cs-134m | 1.64E-15 | Fr-223 | 3.31E-13 | Ho-159 | 1.78E-16 |
| Cs-135 | 2.35E-13 | Ga-65 | 4.79E-16 | Ho-161 | 1.82E-16 |
| Cs-135m | 4.32E-16 | Ga-66 | 1.27E-14 | Ho-162 | 8.17E-17 |
| Cs-136 | 7.65E-14 | Ga-67 | 7.23E-15 | Ho-162m | 6.24E-16 |
| Cs-137 | 1.08E-12 | Ga-68 | 1.42E-15 | Ho-164 | 2.44E-16 |
| Cs-138 | 1.18E-15 | Ga-70 | 4.55E-16 | Ho-164m | 3.31E-16 |
| Cu-60 | 9.44E-16 | Ga-72 | 1.52E-14 | Ho-166 | 1.93E-14 |
| Cu-61 | 2.16E-15 | Ga-73 | 4.25E-15 | Ho-166m | 7.88E-12 |
| Cu-64 | 3.25E-15 | Gd-145 | 5.65E-16 | Ho-167 | 2.09E-15 |
| Cu-67 | 1.66E-14 | Gd-146 | 2.01E-13 | I-120 | 2.85E-15 |
| Dy-155 | 2.25E-15 | Gd-147 | 1.17E-14 | I-120m | 2.43E-15 |
| Dy-157 | 8.55E-16 | Gd-148 | 7.09E-10 | I-121 | 7.58E-16 |
| Dy-159 | 1.21E-14 | Gd-149 | 2.21E-14 | I-123 | 2.07E-15 |
| Dy-165 | 1.77E-15 | Gd-151 | 2.73E-14 | I-124 | 1.22E-13 |
| Dy-166 | 5.73E-14 | Gd-152 | 5.23E-10 | I-125 | 1.43E-13 |
| Er-161 | 1.40E-15 | Gd-153 | 6.59E-14 | I-126 | 2.71E-13 |
| Er-165 | 2.31E-16 | Gd-159 | 8.17E-15 | I-128 | 5.38E-16 |
| Er-169 | 3.19E-14 | Ge-66 | 2.62E-15 | I-129 | 9.88E-13 |
| Er-171 | 6.45E-15 | Ge-67 | 7.07E-16 | I-130 | 1.86E-14 |
| Er-172 | 3.37E-14 | Ge-68 | 8.77E-13 | I-131 | 2.03E-13 |
| Es-250 | 3.72E-14 | Ge-69 | 8.40E-15 | I-132 | 3.14E-15 |
| Es-251 | 5.89E-14 | Ge-71 | 3.28E-16 | I-132m | 2.47E-15 |
| Es-253 | 8.69E-11 | Ge-75 | 1.06E-15 | I-133 | 4.03E-14 |

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**Table 17-7. Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors* (Cont.)**

**Note:* For isotopes not having a direct PE-g conversion factor, the total activity must be treated as Pu-239 for alpha emission and as Cs-137 for beta/gamma emission.

| Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq |
|---|---|---|---|---|---|
| I-134 | 1.54E-15 | Lu-174 | 1.90E-13 | Np-232 | 3.18E-15 |
| I-135 | 8.84E-15 | Lu-174m | 1.16E-13 | Np-233 | 4.68E-17 |
| In-109 | 1.23E-15 | Lu-176 | 4.13E-12 | Np-234 | 1.53E-14 |
| In-110 hr | 3.62E-15 | Lu-176m | 3.17E-15 | Np-235 | 1.72E-14 |
| In-110 min | 1.36E-15 | Lu-177 | 3.29E-14 | Np-236 hr | 2.48E-13 |
| In-111 | 6.73E-15 | Lu-177m | 4.44E-13 | Np-236 yr | 2.18E-10 |
| In-112 | 2.13E-16 | Lu-178 | 7.04E-16 | Np-237 | 1.37E-09 |
| In-113m | 5.77E-16 | Lu-178m | 9.21E-16 | Np-238 | 9.59E-14 |
| In-114m | 2.57E-13 | Lu-179 | 3.02E-15 | Np-239 | 2.82E-14 |
| In-115 | 1.07E-11 | Md-257 | 7.88E-13 | Np-240 | 2.49E-15 |
| In-115m | 1.72E-15 | Md-258 | 1.79E-10 | Os-180 | 4.02E-16 |
| In-116m | 1.31E-15 | Mg-28 | 3.49E-14 | Os-181 | 1.79E-15 |
| In-117 | 8.40E-16 | Mn-51 | 1.19E-15 | Os-182 | 1.06E-14 |
| In-117m | 2.10E-15 | Mn-52 | 3.92E-14 | Os-185 | 4.45E-14 |
| In-119m | 4.99E-16 | Mn-52m | 8.10E-16 | Os-189m | 1.46E-16 |
| Ir-182 | 6.80E-16 | Mn-53 | 9.36E-15 | Os-191 | 5.26E-14 |
| Ir-184 | 3.22E-15 | Mn-54 | 8.99E-14 | Os-191m | 4.36E-15 |
| Ir-185 | 5.25E-15 | Mn-56 | 3.53E-15 | Os-193 | 1.44E-14 |
| Ir-186 | 1.21E-15 | Mo-101 | 7.19E-16 | Os-194 | 2.34E-12 |
| Ir-187 | 2.18E-15 | Mo-90 | 9.96E-15 | P-32 | 1.07E-13 |
| Ir-188 | 1.17E-14 | Mo-93 | 6.39E-14 | P-33 | 4.95E-14 |
| Ir-189 | 1.67E-14 | Mo-93m | 4.71E-15 | Pa-227 | 2.18E-12 |
| Ir-190 | 6.45E-14 | Mo-99 | 2.73E-14 | Pa-228 | 1.91E-12 |
| Ir-190m | 2.84E-16 | Na-22 | 8.03E-13 | Pa-230 | 2.10E-11 |
| Ir-192 | 1.82E-13 | Na-24 | 1.37E-14 | Pa-231 | 6.32E-09 |
| Ir-192m | 1.08E-12 | Nb-88 | 7.88E-16 | Pa-232 | 6.41E-14 |
| Ir-194 | 1.53E-14 | Nb-89(66) | 1.95E-15 | Pa-233 | 1.06E-13 |
| Ir-194m | 3.49E-13 | Nb-89(122) | 3.33E-15 | Pa-234 | 1.14E-14 |
| Ir-195 | 1.97E-15 | Nb-90 | 1.83E-14 | Pb-195m | 7.13E-16 |
| Ir-195m | 4.67E-15 | Nb-93m | 4.87E-14 | Pb-198 | 1.76E-15 |
| K-40 | 2.33E-12 | Nb-94 | 1.34E-12 | Pb-199 | 9.96E-16 |
| K-42 | 9.81E-15 | Nb-95 | 4.82E-14 | Pb-200 | 9.51E-15 |
| K-43 | 1.06E-14 | Nb-95m | 2.42E-14 | Pb-201 | 3.25E-15 |
| K-44 | 9.07E-16 | Nb-96 | 1.83E-14 | Pb-202 | 3.42E-13 |
| K-45 | 6.81E-16 | Nb-97 | 1.24E-15 | Pb-202m | 2.76E-15 |
| Kr-85 | 2.31E-23 | Nb-98 | 1.61E-15 | Pb-203 | 6.01E-15 |
| La-131 | 6.64E-16 | Nd-136 | 1.49E-15 | Pb-205 | 2.34E-14 |
| La-132 | 4.72E-15 | Nd-138 | 6.81E-15 | Pb-209 | 1.68E-15 |
| La-135 | 4.06E-16 | Nd-139 | 2.88E-16 | Pb-210 | 1.55E-10 |
| La-137 | 2.42E-13 | Nd-139m | 4.30E-15 | Pb-211 | 3.31E-13 |
| La-138 | 4.29E-12 | Nd-141 | 1.43E-16 | Pb-212 | 5.22E-12 |
| La-140 | 3.13E-14 | Nd-147 | 6.60E-14 | Pb-214 | 4.05E-13 |
| La-141 | 4.33E-15 | Nd-149 | 2.53E-15 | Pd-100 | 2.36E-14 |
| La-142 | 2.59E-15 | Nd-151 | 4.94E-16 | Pd-101 | 1.70E-15 |
| La-143 | 6.22E-16 | Ni-56 | 2.89E-14 | Pd-103 | 1.23E-14 |
| Lu-169 | 1.06E-14 | Ni-57 | 1.46E-14 | Pd-107 | 1.61E-14 |
| Lu-170 | 1.84E-14 | Ni-59 | 1.22E-14 | Pd-109 | 1.03E-14 |
| Lu-171 | 2.42E-14 | Ni-63 | 3.46E-14 | Pm-141 | 4.07E-16 |
| Lu-172 | 4.28E-14 | Ni-65 | 2.47E-15 | Pm-143 | 7.95E-14 |
| Lu-173 | 8.84E-14 | Ni-66 | 4.94E-14 | | |

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**Table 17-7. Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors* (Cont.)**

**Note:* For isotopes not having a direct PE-g conversion factor, the total activity must be treated as Pu-239 for alpha emission and as Cs-137 for beta/gamma emission.

| Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq |
|---|---|---|---|---|---|
| Pm-144 | 4.70E-13 | Ra-226 | 2.62E-10 | Sb-118m | 3.37E-15 |
| Pm-145 | 2.32E-13 | Ra-227 | 1.26E-14 | Sb-119 | 1.03E-15 |
| Pm-146 | 1.22E-12 | Ra-228 | 4.41E-10 | Sb-120 day | 3.02E-14 |
| Pm-147 | 1.92E-13 | Rb-79 | 7.73E-16 | Sb-120 min | 2.01E-16 |
| Pm-148 | 5.97E-14 | Rb-81 | 2.19E-15 | Sb-122 | 3.11E-14 |
| Pm-148m | 1.58E-13 | Rb-81m | 4.85E-16 | Sb-124 | 2.36E-13 |
| Pm-149 | 1.99E-14 | Rb-82m | 3.95E-15 | Sb-124m | 1.62E-16 |
| Pm-150 | 3.63E-15 | Rb-83 | 3.98E-14 | Sb-125 | 3.26E-13 |
| Pm-151 | 1.30E-14 | Rb-84 | 6.93E-14 | Sb-126 | 8.92E-14 |
| Po-203 | 1.01E-15 | Rb-86 | 1.29E-13 | Sb-126m | 5.39E-16 |
| Po-205 | 1.91E-15 | Rb-87 | 4.18E-13 | Sb-127 | 5.16E-14 |
| Po-207 | 2.30E-15 | Rb-88 | 7.58E-16 | Sb-128 hr | 1.16E-14 |
| Po-210 | 1.17E-10 | Rb-89 | 6.11E-16 | Sb-128 min | 4.08E-16 |
| Pr-136 | 3.78E-16 | Re-177 | 4.03E-16 | Sb-129 | 6.87E-15 |
| Pr-137 | 5.76E-16 | Re-178 | 4.03E-16 | Sb-130 | 1.48E-15 |
| Pr-138m | 2.06E-15 | Re-181 | 7.18E-15 | Sb-131 | 1.20E-15 |
| Pr-139 | 5.45E-16 | Re-182(12.7) | 5.72E-15 | Sc-43 | 3.15E-15 |
| Pr-142 | 1.52E-14 | Re-182(64) | 3.57E-14 | Sc-44 | 5.05E-15 |
| Pr-142m | 1.93E-16 | Re-184 | 6.35E-14 | Sc-44m | 3.94E-14 |
| Pr-143 | 6.71E-14 | Re-184m | 2.76E-13 | Sc-46 | 1.86E-13 |
| Pr-144 | 5.03E-16 | Re-186 | 3.25E-14 | Sc-47 | 1.99E-14 |
| Pr-145 | 4.61E-15 | Re-186m | 1.70E-12 | Sc-48 | 3.07E-14 |
| Pr-147 | 5.20E-16 | Re-187 | 1.15E-15 | Sc-49 | 1.09E-15 |
| Pt-186 | 1.59E-15 | Re-188 | 1.50E-14 | Se-70 | 2.11E-15 |
| Pt-188 | 5.38E-14 | Re-188m | 3.66E-16 | Se-73 | 5.77E-15 |
| Pt-189 | 2.73E-15 | Re-189 | 1.26E-14 | Se-73m | 5.97E-16 |
| Pt-191 | 7.80E-15 | Rh-99 | 2.41E-14 | Se-75 | 3.67E-14 |
| Pt-193 | 1.84E-14 | Rh-99m | 1.11E-15 | Se-79 | 1.86E-13 |
| Pt-193m | 2.68E-14 | Rh-100 | 9.81E-15 | Se-81 | 4.04E-16 |
| Pt-195m | 3.17E-14 | Rh-101 | 1.49E-13 | Se-81m | 1.40E-15 |
| Pt-197 | 9.59E-15 | Rh-101m | 5.76E-15 | Se-83 | 9.29E-16 |
| Pt-197m | 2.18E-15 | Rh-102 | 4.82E-13 | Si-31 | 2.17E-15 |
| Pt-199 | 7.95E-16 | Rh-102m | 1.97E-13 | Si-32 | 3.12E-12 |
| Pt-200 | 1.69E-14 | Rh-103m | 7.51E-17 | Sm-141 | 4.38E-16 |
| Pu-234 | 6.52E-13 | Rh-105 | 9.66E-15 | Sm-141m | 9.21E-16 |
| Pu-235 | 4.16E-17 | Rh-106m | 3.04E-15 | Sm-142 | 2.05E-15 |
| Pu-236 | 2.88E-10 | Rh-107 | 4.58E-16 | Sm-145 | 8.03E-14 |
| Pu-237 | 1.08E-14 | Rn-220 | 1.66E-24 | Sm-146 | 6.99E-10 |
| Pu-238 | 4.42E-10 | Rn-222 | 1.71E-24 | Sm-147 | 6.35E-10 |
| Pu-239 | 4.41E-10 | Ru-94 | 1.22E-15 | Sm-151 | 2.53E-13 |
| Pu-240 | 4.41E-10 | Ru-97 | 3.00E-15 | Sm-153 | 1.91E-14 |
| Pu-241 | 4.80E-12 | Ru-103 | 8.10E-14 | Sm-155 | 4.90E-16 |
| Pu-242 | 4.13E-10 | Ru-105 | 4.93E-15 | Sm-156 | 6.62E-15 |
| Pu-243 | 2.38E-15 | Ru-106 | 1.81E-12 | Sn-110 | 4.45E-15 |
| Pu-244 | 3.43E-10 | S-35 | 5.12E-14 | Sn-111 | 3.79E-16 |
| Pu-245 | 1.20E-14 | Sb-115 | 3.76E-16 | Sn-113 | 1.08E-13 |
| Ra-223 | 2.39E-10 | Sb-116 | 3.60E-16 | Sn-117m | 7.73E-14 |
| Ra-224 | 9.21E-11 | Sb-116m | 1.35E-15 | Sn-119m | 9.14E-14 |
| Ra-225 | 2.13E-10 | Sb-117 | 4.82E-16 | Sn-121 | 6.84E-15 |

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**Table 17-7. Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors* (Cont.)**

**Note:* For isotopes not having a direct PE-g conversion factor, the total activity must be treated as Pu-239 for alpha emission and as Cs-137 for beta/gamma emission.

| Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq | Nuclide | Conversion Factors PE-g/Bq |
|---|---|---|---|---|---|
| Sn-121m | 4.12E-13 | Tc-93m | 4.79E-16 | Tm-170 | 2.56E-13 |
| Sn-123 | 3.54E-13 | Tc-94 | 3.53E-15 | Tm-171 | 5.87E-14 |
| Sn-123m | 7.80E-16 | Tc-94m | 1.26E-15 | Tm-172 | 3.37E-14 |
| Sn-125 | 9.66E-14 | Tc-96 | 1.95E-14 | Tm-173 | 5.31E-15 |
| Sn-126 | 4.25E-12 | Tc-96m | 2.10E-16 | Tm-175 | 5.34E-16 |
| Sn-127 | 3.95E-15 | Tc-97 | 4.91E-14 | U-230 | 4.46E-10 |
| Sn-128 | 2.68E-15 | Tc-97m | 1.14E-13 | U-231 | 1.42E-14 |
| Sr-80 | 3.74E-15 | Tc-98 | 1.23E-12 | U-232 | 1.02E-09 |
| Sr-81 | 1.02E-15 | Tc-99 | 3.67E-13 | U-233 | 2.64E-10 |
| Sr-83 | 9.36E-15 | Tc-99m | 5.54E-16 | U-234 | 2.59E-10 |
| Sr-85 | 2.26E-14 | Te-116 | 3.05E-15 | U-235 | 2.33E-10 |
| Sr-85m | 1.19E-16 | Te-121 | 1.14E-14 | U-236 | 2.40E-10 |
| Sr-87m | 5.80E-16 | Te-121m | 1.56E-13 | U-237 | 5.17E-14 |
| Sr-89 | 2.18E-13 | Te-123 | 1.08E-13 | U-238 | 2.21E-10 |
| Sr-90 | 4.32E-12 | Te-123m | 1.40E-13 | U-239 | 6.61E-16 |
| Sr-91 | 1.12E-14 | Te-125m | 1.14E-13 | U-240 | 1.60E-14 |
| Sr-92 | 6.23E-15 | Te-127 | 3.83E-15 | V-47 | 8.40E-16 |
| Ta-172 | 9.66E-16 | Te-127m | 2.69E-13 | V-48 | 7.40E-14 |
| Ta-173 | 3.20E-15 | Te-129 | 1.08E-15 | V-49 | 1.89E-15 |
| Ta-174 | 1.19E-15 | Te-129m | 2.18E-13 | W-176 | 1.90E-15 |
| Ta-175 | 3.69E-15 | Te-131 | 7.80E-16 | W-177 | 1.28E-15 |
| Ta-176 | 5.53E-15 | Te-131m | 2.94E-14 | W-178 | 2.13E-14 |
| Ta-177 | 2.87E-15 | Te-132 | 5.64E-14 | W-179 | 3.78E-17 |
| Ta-178 | 1.88E-15 | Te-133 | 5.39E-16 | W-181 | 7.51E-15 |
| Ta-179 | 1.56E-14 | Te-133m | 2.44E-15 | W-185 | 1.06E-13 |
| Ta-180 | 7.04E-13 | Te-134 | 1.90E-15 | W-187 | 1.15E-14 |
| Ta-180m | 1.22E-15 | Th-226 | 1.69E-12 | W-188 | 4.27E-13 |
| Ta-182 | 2.87E-13 | Th-227 | 2.85E-10 | Xe-120 | 1.72E-21 |
| Ta-182m | 5.89E-16 | Th-228 | 1.09E-09 | Xe-121 | 8.30E-21 |
| Ta-183 | 6.00E-14 | Th-229 | 6.58E-09 | Xe-122 | 2.12E-22 |
| Ta-184 | 1.21E-14 | Th-230 | 2.79E-09 | Xe-123 | 2.71E-21 |
| Ta-185 | 1.34E-15 | Th-231 | 9.21E-15 | Xe-125 | 1.04E-21 |
| Ta-186 | 5.02E-16 | Th-232 | 3.02E-09 | Xe-127 | 1.09E-21 |
| Tb-147 | 2.21E-15 | Th-234 | 2.12E-13 | Xe-129m | 8.85E-23 |
| Tb-149 | 1.49E-13 | Ti-44 | 3.43E-12 | Xe-131m | 3.38E-23 |
| Tb-150 | 3.14E-15 | Ti-45 | 2.57E-15 | Xe-133 | 1.29E-22 |
| Tb-151 | 6.61E-15 | Tl-194 | 1.62E-16 | Xe-133m | 1.24E-22 |
| Tb-153 | 5.67E-15 | Tl-194m | 8.55E-16 | Xe-135 | 1.07E-21 |
| Tb-154 | 1.05E-14 | Tl-195 | 7.36E-16 | Xe-135m | 1.83E-21 |
| Tb-155 | 6.61E–15 | Tl-197 | 1.06E-15 | Xe-138 | 5.28E-21 |
| Tb-156 | 3.35E-14 | Tl-198 | 2.06E-15 | Y-86 | 1.30E-14 |
| Tb-156m(5.0) | 2.88E-15 | Tl-198m | 1.90E-15 | Y-86m | 7.88E-16 |
| Tb-156m(24.4) | 6.41E-15 | Tl-199 | 1.31E-15 | Y-87 | 1.08E-14 |
| Tb-157 | 8.17E-14 | Tl-200 | 4.92E-15 | Y-88 | 1.69E-13 |
| Tb-158 | 2.88E-12 | Tl-201 | 5.31E-15 | Y-90 | 4.12E-14 |
| Tb-160 | 2.27E-13 | Tl-202 | 1.08E-14 | Y-90m | 2.78E-15 |
| Tb-161 | 3.86E-14 | Tl-204 | 5.22E-13 | Y-91 | 2.45E-13 |
| Tc-101 | 3.40E-16 | Tm-162 | 4.53E-16 | Y-91m | 3.13E-16 |
| Tc-104 | 7.88E-16 | Tm-166 | 4.99E-15 | Y-92 | 4.85E-15 |
| Tc-93 | 9.81E-16 | Tm-167 | 3.51E-14 | Y-93 | 1.16E-14 |

**Table 17-7. Plutonium Equivalent Gram (PE-g) Radionuclide Conversion Factors* (Cont.)**

**Note:* For isotopes not having a direct PE-g conversion factor, the total activity must be treated as Pu-239 for alpha emission and as Cs-137 for beta/gamma emission.

| Nuclide Conversion Factors PE-g/Bq | | Nuclide Conversion Factors PE-g/Bq | | Nuclide Conversion Factors PE-g/Bq | |
|---|---|---|---|---|---|
| Y-94 | 7.65E-16 | Yb-178 | 2.07E-15 | Zn-72 | 3.58E-14 |
| Y-95 | 4.34E-16 | Zn-62 | 1.50E-14 | Zr-86 | 1.20E-14 |
| Yb-162 | 3.84E-16 | Zn-63 | 1.01E-15 | Zr-88 | 1.00E-13 |
| Yb-166 | 2.12E-14 | Zn-65 | 6.18E-14 | Zr-89 | 1.51E-14 |
| Yb-167 | 1.91E-16 | Zn-69 | 7.73E-16 | Zr-93 | 6.90E-13 |
| Yb-169 | 8.17E-14 | Zn-69m | 7.33E-15 | Zr-95 | 1.61E-13 |
| Yb-175 | 1.99E-14 | Zn-71m | 4.47E-15 | Zr-97 | 2.71E-14 |
| Yb-177 | 1.91E-15 | | | | |

### *17.2.4 Lead Shielding*

The use of lead for shielding (radioactively contaminated or radioactively uncontaminated) in containers for the disposal of waste is an acceptable practice.

Generators must maintain the following:

- Documentation demonstrating that standard packaging without lead shielding would not reduce the exposure rate to less than 0.005 rem/hr (5 mrem/hr) at 30 cm and the shielding is necessary for radiation protection; and
- Documentation demonstrating that the amount of lead used for shielding is not excessive for each specific container of waste. The documentation must include calculations demonstrating the amount of lead (thickness/quantity) in the container is not excessive by justifying the quantity of lead required in each given container on a container-by-container basis. Justification for using the appropriate amount of lead shielding can be demonstrated by a detailed dose survey that shows the shielded dose rate exceeds 0.005 rem/hr at 30 cm from the waste package.

For lead shielded containers that have been evaluated as directed above (e.g., dose rates from standard packaging without lead shielding, lead shielding is not excessive), the documentation must be provided to the NNSA/NFO RWAP Manager through the LANL WCO by e-mail to wco@lanl.gov at least seven days in advance of waste shipment.

Additional information on the use of lead shielding can be found on the *Position Paper on the Use of Lead Shielding for the Disposal of Low Level Waste at the NNSS*.

### *17.2.5 Strength*

The disposal package (packaging and contents) must be capable of supporting a uniformly distributed load (compressive strength) of 16,477 kg/m$^2$ (3,375 lb/ft$^2$).This is required to support other waste packages and earth cover without crushing during stacking and covering operations. Actual physical testing or design engineering calculations may be used to demonstrate compliance. This requirement does not apply to bulk waste, waste packaged in steel drums, or cargo containers.

Bulk waste containers, including cargo containers, must be sufficiently strong to avoid breaching under normal offloading conditions. Bulk waste containers with a reasonable probability of breaching during offloading (i.e., burrito wraps), regardless of the type of transport vehicle (e.g., intermodals), must meet the package activity limitations of Section 17.2.2 of this attachment for soft-sided packages. Alternative packaging may be approved on a case-by-case basis. In the event alternate packaging is necessary, WCO personnel will contact NNSS for approval.

### *17.2.6 Handling*

Packages exceeding 1 mSv/hr (100 mR/hr) dose rate at 30 centimeters must be considered for remote handling. Handling procedures and As-Low-As-Reasonably Achievable (ALARA) documentation must be referenced on the WSP for wastes requiring remote handling and will be made available to the NNSS disposal site upon request.

Before shipment, dose rates must be forwarded to RWMC by the LANL WCO for internal packages when they are being removed for disposal (e.g., canisters removed from a Type B cask.)

Waste packages must be provided with cleats, offsets, rings, handles, permanently attached or removable skids, or other auxiliary lifting devices to allow handling by means of forklift, cranes, or similar handling equipment. All waste packages requiring cranes for off-loading must have an approved lift plan generated by NNSS RWMC before shipment. Additional costs incurred by development and implementation will be the responsibility of the waste generator. Waste packages with permanently attached lifting devices are permissible, provided they are recessed, offset, or hinged in a manner that does not inhibit stacking the packages. Auxiliary lifting devices for any portion of the package extending from the top of the waste package must be no higher than 0.1 meter (4 inches) in normal position. Lifting devices must be designed in accordance with DOE-STD-1090, *Hoisting and Rigging* (current publication).

Lifting devices that are a structural part of the package must be designed with a minimum safety factor of three-to-one against yielding when used to lift the package to ensure any failure of a lifting attachment under excessive load would not impair the integrity of the package. Any other structural part of the package that could be used to lift the package must be capable of being rendered inoperable for lifting the package during transport or must be designed with strength equivalent to that required for lifting attachments.

Rigging devices (e.g., slings, spreader bars, rings, hooks) not permanently attached to the waste package that are provided by the generator for off loading must have a current load test based on the requirements of DOE-STD-1090. Non-permanently attached rigging devices must have traceable certifications provided with the shipping documents. They must not show any signs of corrosion, kinking, birdcaging, or other deterioration.

Waste packages that have abnormal centers of gravity must be clearly marked with the center of gravity. Top-heavy loads are severely discouraged, and bulk waste shipments with complex geometries must be loaded in the most stable configuration. Cargo containers are exempted from this requirement until the gross weight exceeds 30,000 lb.

For waste packages that are DOT Type B or DOT Type AF and are being delivered to the RWMC by the LANL WCO for waste removal, the generators must submit the following information:

- CoC for the package
- Sections 1, 7, and 8 of the Safety Analysis Report for Packaging (SARP) for the package
- Section 9 of the SARP for those packages that have a Section 9
- Certificates for all rigging

Bulk waste containers that require special handling may incur additional cost.

### *17.2.7 Size*

Waste containers/packages that allow for optimum handling and stacking efficiency in disposal cells should be considered for use (i.e., cargo containers, boxes measuring 4 ft. × 4 ft. × 7 ft. or 4 ft. × 2 ft. × 7 ft. or 55/85-gallon drums.)

Alternate packages will be considered, however, the LANL WCO must contact the RWMC operations personnel to be consulted to ensure compatibility.

MLLW, Classified Waste, RALLW, PCBs, or Low-Level Hydrocarbon-Burdened waste that is not packaged in hard-sided containers meeting the strength requirement, allowing the packages to be stacked at least 14 feet high in a safe and stable manner, may incur additional handling costs.

Bulk waste generally exists in a form not suited to conventional packaging requirements. Bulk waste must meet the requirements of 49 CFR, *Transportation*. Large items of bulk waste, such as machinery, may be considered for disposal unpackaged. For the transfer of unpackaged bulk material having external contamination, the contamination must be fixed, covered, or contained sufficiently for safe transfer.

Refer to Appendix F of the NNSS WAC for specific packaging requirements and limitations for intermodal containers (roll-off boxes) to be returned to the generator. All other types of containers that are requested to be returned will be evaluated on a case-by-case basis during the NNSS-WP review process. The request that containers be returned should be identified in the special-handling section of the NNSS-WP. The return of containers may incur additional operational costs.

### *17.2.8 Weight*

Weight limits for final waste packages must not exceed the approved packaging design or NNSS limits of 4,082 kg (9,000 lb) per box and 544 kg (1,200 lb) per drum. These weight limits do not apply to bulk wastes.

Exception to the specified box weight limit is allowed if the following requirements are satisfied:

- Final weight must not exceed the approved manufacturer design limits.
- Final weight of MLLW must not exceed the NNSS Real-Time Radiography (RTR) weight capacity of 11000 lbs.
- Boxes exceeding 11,000 lbs must be shipped on a flatbed trailer and cribbed to a 4-inch minimum height to allow offloading with a forklift.

### *17.2.9 Loading (Void Space) (MLLW)*

Waste packages must be loaded to ensure that the interior volume is as efficiently and compactly loaded as practical to minimize void space. More than one waste stream may be packaged in a disposal container, except those waste streams that must be profiled separately (MLLW, Classified Waste, RALLW, etc.). MLLW packages must meet the void space criteria in Section 17.3.7.b.

#### *17.2.9.a Void Space*

Unless packages are very small, such as an ampule, containers must be either:

- At least 90 percent full when placed in the landfill; or
- Crushed, shredded, or similarly reduced in volume to the maximum practical extent before burial in the landfill.

### *17.2.10 Package Protection*

Methods must be employed to ensure that the integrity of the in-process waste package is not compromised (e.g., prohibited items are not introduced into the waste package).

Once the waste package certification activities have been completed and the packages have been sealed, the packages must be stored in a secure, protected Area to prevent deterioration and unauthorized intrusion. Storage should include protection from adverse weather, particularly rain and snow. Tamper-Indicating Devices (TIDs), clips, or banding can be used to indicate that the package has not been opened. The devices must not contain lead.

Generators must ensure that waste is handled, stored, and shipped in accordance with applicable DOE, DOT, EPA, state, and local regulations and requirements.

#### *17.2.10.a Prohibited Items*

The following waste types or materials must not be packaged with solid LLW destined for disposal at NNSS:

- Pathogens, infectious wastes, or other etiologic agents as defined in 49 CFR 173.134, *Shippers—General Requirements for Shipments and Packagings—Definitions and exceptions*;
- Pyrophorics (Pyrophoric materials contained in the waste must be treated, prepared, and packaged to be nonflammable. Pyrophoric materials that are blended in a hardened concrete matrix are considered to be treated to be nonflammable.);

- Chelating agents; waste packages containing chelating or complexing agents in amounts greater than one percent of the waste must not be accepted unless stabilized or solidified; and
- TRU waste.

### *17.2.11 Marking and Labeling*

Each waste package must be marked and labeled according to Appendix C in the NNSS WAC. Packages must have the following markings and labels:

- Marking and labeling as required in 49 CFR, *Transportation*. For additional asbestos and beryllium labeling, see Sections 17.1.14 and 17.1.16 of this attachment respectively.
- "Package Certification Label" (Fig. 17-1) signed by the WCO or package certifier. If the waste is unpackaged bulk, a signed package certification label must accompany the shipment papers.
- Shipment number in the following sequence: Two alpha character generator-site-designator codes assigned by the NNSA/NFO Waste Management Project (WMP) (see Table 17-8), one alpha character for type of waste (L for LLW, M for mixed waste), two numerical characters for the current fiscal year, and then three numerical characters for the shipment sequence (e.g., LA99001 indicates the first shipment from LANL of LLW in fiscal year 1999). This number must be on the barcode.
- The package number must be six characters (alpha, numeric, or combination) with no duplication within the shipment. This number must be on the barcode.
- The package weight in units of kilograms and pounds must be included on the side of each waste package. This requirement can be met through the use of a label, additions to barcode labels, or by writing the weight on the side of the waste package.
- For intermodals, markings and labels not intended for NNSS or DOT must be obliterated, and the placards must be removable by the transporter.
- Markings and labels must be intact and readable when the shipment arrives at the disposal site.

#### *17.2.11.a Marking and Labeling*

In addition to the marking and labeling requirements in Appendix C of the NNSS WAC, packages of 451 liters (119 gallons) or less must be marked with the following:

- The words "HAZARDOUS WASTE – Federal law prohibits improper disposal. If found, contact the nearest police or public safety authority of the U.S. Environmental Protection Agency;"
- Generator's name and address;
- Manifest Document Number.

The marking must be durable, in English, displayed on a background of sharply contrasting color, printed or affixed to the surface of the package; or on a label, tag, or sign unobscured by other labels or attachments, located away from any marking that could substantially reduce its effectiveness.

Marking and labeling of the waste packages must be for the hazardous and radioactive characteristics of the waste.

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PACKAGE CERTIFICATION LABEL

This label certifies this container and its contents meet the requirements of DOT (49 CFR), EPA (40 CFR), and NNSS WAC for transportation and disposal.

PACKAGE NUMBER:
DATE:
CERTIFIED BY (print):
CERTIFIED BY (signature):

Waste Certification Official ☐
Alternate Waste Certification Official ☐
Package Certifier ☐

RWMC DESIGNATION (i.e., ONLO, ARIR):

SAMPLE

**Fig. 17-1. Sample of the package certification labels (reference Fig. C-2. Package Certification Label, Nevada National Security Site [NNSS] WAC) that are used for package certification to the NNSS.**

**Table 17-8. Generator Waste Stream and Shipment Codes**

| Generator | Radioactive Waste Management Complex (RWMC) Designation | Site Designator |
|---|---|---|
| Aberdeen Proving Ground | USAA | AP |
| Advanced Mixed Waste Treatment Project | AMWP | AM |
| Argonne National Lab | ANLE | AE |
| Boeing | BNRC | BN |
| Brookhaven National Lab | BNLX | BR |
| Y-12 | BWXT | BW |
| Duratek/ES | DRTK | DR |
| GA Technologies | BGAT | BG |
| Idaho National Laboratory | NEID | NE |
| Idaho Cleanup Project | INEL | IN |
| LANL | LANL | LA |
| Lawrence Livermore National Laboratory | BCLA | LL |
| Nevada National Security Site (NNSS) | LRY5 | DP |
| Nuclear Fuel Services | NFSI | NF |
| Oak Ridge Reservation | ORTN | OR |
| Paducah | PGDP | PD |
| Pantex | AMHP | PX |
| Permafix (M&EC) | PERM | PF |
| Portsmouth | PORT | PO |
| Sandia–Albuquerque | ASLA | SA |
| Savannah River | SVRS | SR |
| Navarro-Intera | LITN | IT |
| TRU Waste Processing Center | FWOR | FW |
| Oak Ridge National Laboratory | ORNL | OL |
| West Valley | WVDP | WV |
| ***Note:*** If generator site is not listed, develop designations and submit with first waste profiles. A database verification of uniqueness will be conducted by Radioactive Waste Acceptance Program (RWAP). | | |

### *17.2.12 Bar Coding*

The shipment and package numbers must be bar coded according to the standards in Appendix C of the NNSS WAC.

### *17.2.13 Contamination Levels*

External contamination levels for waste packages and transport vehicles must meet the release limits specified in 10 CFR 835, *Occupational Radiation Protection*, Appendix D, *Surface Contamination Values*. Before shipment, internal contamination levels (i.e., internal contamination of a Type B cask for waste removal and return to the generator) must be forwarded to RWMC by the LANL WCO.

Removable contamination from inside of a cask, intermodal, sea/land, overpack, or equivalent container that requires any inner package(s) to be removed must be reported on the ALARA planning spreadsheet.

#### *17.2.14 Waste Containers and Shipping Configuration*

Generators must ensure the following requirements are satisfied to improve transportation safety and off loading at the NNSS:

- Waste containers used for shipping, at a minimum, will be Industrial Package-1 (packaging meeting the requirements of 49 CFR 173.410, *General Design Requirements*, and 49 CFR 173.411, *Industrial Packaging*).
- Waste packaged in drums will be palletized and banded. Pallet design should ensure they will support container weights without failure during handling and shipping. Banding should securely hold the drums to the pallet. Typical banding configurations would include two vertical and two horizontal bands around the drums. Drum palletizing and banding requirements do not apply to drums in groups of three drums or less.
- Wastes packaged in drums must be shipped in a closed transport vehicle. Conestoga and other curtain-side trailers are accepted as closed transport vehicles.
- Waste being transported as bulk waste with no packaging (Surface Contaminated Object [SCO], Low Specific Activity [LSA], equipment, large machinery, etc.) must be identified on the waste profile with a complete description of the item(s) and the means to which the waste will meet regulatory requirements. These will be approved on a case-by-case basis.

### 17.3 Mixed Low-Level Waste

MLLW offered for disposal must meet the applicable characterization, treatment, packaging, and disposal requirements of the NNSS WAC, 40 CFR, *Protection of Environment*, state of Nevada, and state-of-generation regulations. Hazardous classified matter shipped to the NNSS for permanent burial must meet the applicable requirements in this section.

#### *17.3.1 Acceptable Hazardous Waste Numbers*

MLLW accepted for disposal must have one or more of the EPA hazardous waste numbers listed below or must be considered a hazardous waste in the state of generation:

**Waste Codes**

- D004 through D043
- F001 through F011, F039
- P001 through P205
- U001 through U249, U271, U278, U279, U280, U328, U353, U359, U364, U367, U373, U387, U389, U394, U395, U404, U411

Additional waste codes may be added through NNSS permit modifications without necessitating a NNSS WAC revision. If a waste code is not identified in the list above, please contact the LANL WCO to consult the NNSA/NFO RWAP Manager, and a determination will be made as to its acceptability.

### *17.3.2 Mixed Waste Treatment Notification*

Generators with MLLW and classified non-radioactive hazardous waste/matter that requires treatment to meet the LDR standards, but the treatment has yet to occur, must submit to NNSA/NFO the information contained in the Pre-Treatment Notification Form found in Appendix G of the NNSS WAC. This will allow the scheduling of on-site verification activities in accordance with Section 3.3.8 of the NNSS WAC. If treatment is performed by a commercial facility, it must have a current DOE Consolidated Audit Program (DOECAP) audit, or equivalent.

### *17.3.3 Analytical Data*

Analytical data used to make characterization determinations or LDR certifications must be from a DOECAP audited laboratory, or equivalent (i.e., State Certified or Carlsbad Field Office Certified). Generators must document their review and acceptance of the most recent certification audit for analytical laboratory used.

### *17.3.4 MLLW and Classified Non-Radioactive Hazardous Waste/Matter Verification*

Verification frequencies and methods for Nevada National Security Site-Mixed Waste Profiles (NNSS-MWPs) are determined by the Nevada waste acceptance review panel in accordance with RWAP instructions. The methods include split sampling, field chemical screening, visual inspection and/or RTR at the generator or treatment facility and RTR at the NNSS. Verifications are conducted in accordance with RWAP instructions. LANL generators must abide by LANL waste certification requirements and request for waste verification.

### *17.3.5 Verification Frequency*

Verification frequencies are assigned by the Nevada waste acceptance review panel. In accordance with the profile, a minimum of 5 percent of waste containers must be physically screened by either visual inspection or RTR.

Exceptions to the physical screening requirements must be approved by the NNSA/NFO RWAP Manager. All NNSS site visits will be facilitated through the LANL WCO and cooperation is required by the generator site.

Unless exempted, a minimum of 10 percent of containers physically screened must be chemically screened. The following wastes are exempted from chemical screening:

- Waste subjected to an LDR-specified technology standard
- Hazardous debris
- Chemical-containing equipment removed from service (ballasts, batteries, etc.)
- Waste/matter containing regulated asbestos
- Waste/matter from the cleanup of spills or a release of a single substance or known material (e.g., material for which a Material Safety Data Sheet [MSDS] can be provided)
- Confirmed noninfectious waste generated from laboratory tissue preparation, slide staining, or fixing processes
- Waste/matter containing beryllium

Chemical screening of container contents is performed by generator personnel under the supervision of RWAP at the generator's site. Chemical screening materials will be provided by RWAP.

If a container is too large to RTR at NNSS, the waste will be visually verified at the generator's site.

Generators must provide the necessary authorizations, facilities, and personnel to allow RWAP personnel to perform verification at the generator or treatment facility.

RWAP personnel must be provided access to containers and facilities to allow for visual inspection of the contents of packaged containers, performing chemical screening on homogeneous samples of the waste, and split sampling.

### *17.3.6 Previously Rejected Packages*

Packages (parent packages) previously rejected that are repackaged and/or split into additional packages (progeny packages) must be traceable to the original package number.

In addition to the transportation and shipping requirements of Section 6.0 of the NNSS WAC, generators must notify NNSA/NFO before shipping previously rejected packages (parent and/or progeny) back to NNSS.

## 17.4 NNSS WAC Deviations

Deviations from the NNSS WAC that do not compromise the performance objectives for the disposal site, NNSS Documented Safety Analysis requirements and limitations, or violate permit requirements are evaluated on a case-by-case basis for acceptance. Deviations are not used as an all-inclusive relief from meeting a specified NNSS WAC requirement.

The following information must be provided with the NNSS-WP or as a stand-alone document approved by the WCO:

- NNSS WAC requirement(s) that cannot be satisfied;
- Justification for not meeting the requirement that includes a description of the item(s) and/or process affected;
- Duration of the deviation; and
- Planned action(s) to correct the deviation, if applicable.

**Example:**

*Requirement:* NNSS WAC, Revision 10, Section 3.2.5, *Strength*, requires that disposal packages must be capable of supporting a uniformly distributed load of 16,477 kg/m$^2$ (3,375 lb/ft$^2$).

*Justification:* Two 4 x 4 x 7 ft metal boxes (#33248 and #33798) do not meet the NNSS WAC strength requirement. Because of ALARA concerns, the generator seeks to avoid unnecessary exposure to personnel. The boxes will be clearly marked “Box Does Not Meet NNSS WAC Strength Requirement,” at a minimum, on the top and one side.

*Duration:* One time only for box numbers 33248 and 33798.

*Corrective Action*: None required; it is the intent of the generator to ensure that only compliant containers will be used on future shipments.

## 17.5 Waste Packaged in Intermodals

The following waste should be considered for packaging in intermodal containers:

- Soil and gravel
- Concrete rubble
- Scrap metal
- Building rubble

### *17.5.1 Requirements for Intermodal (Roll-off boxes) Low-Level Waste Disposal (LLWD)*

Intermodal (roll-up) containers used for the disposal of bulk LLW must meet the following criteria. These criteria are specific to intermodal roll-off containers that will be unloaded and returned to the generator site. These criteria are in addition to the other NNSS WAC requirements.

1. Prohibited Waste Types:
    a. RALLW
    b. Low-Level Hydrocarbon Burdened (LLHB) waste

c. PCB waste not meeting 40 CFR 761.62(b)(1), *Disposal of PCB Bulk Product Waste, Disposal in Solid Waste Landfills*

d. Fine particulates that could become airborne

e. Gas cylinders, fire extinguishers, aerosol cans (pressurized or not)

f. LLW beryllium waste (particulate)

g. Sealed sources

h. Classified Waste

i. MLLW

2. Acceptable Waste Types

   a. Soil and gravel

   b. Concrete rubble

   c. Scrap metal

   d. Building rubble

   e. Other materials may be acceptable (with previous approval on a case-by-case basis)

   f. PCB bulk product waste meeting 40 CFR 761.62(b)(1)

3. Dose rates and Radiological Concerns

   a. Dose rates should be less than 5 mrem/h on contact of the loaded intermodal container.

   b. Dose rates must be less than 5 mrem/h @ 30 cm from the waste.

   c. Return survey requirements must be clearly communicated to NNSS waste operations upon profile submission.

4. Radionuclide Activities

   a. Activities must be less than 300 Plutonium Equivalent Gram (PE-g) based on conversions covered in Section 17.2.2 of this attachment.

5. Size, Weight, and Loading

   a. All pieces within container must be reduced to no larger than 3 ft in any dimension.

   b. Soils need to be free of scrap metals, large rocks, or debris.

   c. Maintain a clearance of at least 18 inches between the top of the waste and the bottom of the top header brace located near the door end of the container.

   d. Waste must fit in the intermodal container without wedging into any area of the container.

   e. The load must be prepared to prevent movement during transportation and allow the waste to exit under the header and through the rear door with sufficient clearance to prevent jamming.

f. Precaution must be taken during loading to ensure that the weight is not resting against the door.

6. Weights
   a. The weight of the intermodal may not exceed 44,000 lb. gross weight.
   b. The weight must be evenly distributed.

7. Liners—Waste must be placed in a liner within the roll-off container.
   a. Liners must be at least 18 mil for scrap metals and debris.
   b. Liners must be at least 12 mil for contaminated soils.
   c. Liners must be secured around the waste package and cannot be attached to the inside of the intermodal container.
   d. Sufficient absorbent material needs to be added to prevent any accumulation of free liquids inside the container, either from precipitation penetration or from condensation.

8. Marking and Labeling
   a. All markings and labels not intended for NNSS or DOT use must be obliterated.
   b. All placards must be removable by the transporter.

9. Container Design
   a. No top-hinged tailgate intermodals will be accepted for disposal.
   b. There must be no need for RWMC Operations to open the top lid of the container for any reason.
   c. There must be attachments to secure the door in the open position during off-loading.
   d. Containers must be at least standard 6 ft × 8 ft × 20 ft Industrial Package (IP)-1 intermodals with hard-lid covers.

10. Off–Loading
    a. Any container that does not off-load successfully will be buried intact.

## 17.6 Barcoding

Waste packages must be barcoded in accordance with the requirements of Appendix C of the NNSS WAC. Barcodes (see Fig. 17-2) used on packages must meet the following standards:

- Code 39 (NNSS WAC)
- Low-to-medium-density; low-density (preferred)
- 1-inch high barcode (not to exceed 6 inches wide)
- Human Readable Interpretation (HRI) 1/2 inch high, printed below the barcode
- Spacing between the barcode and HRI will be 1/10 inch

- Minimum left and right margin (quiet zones) will be at least 1/25 inch
- Barcodes and HRI will be stacked with a minimum separation of 1/2 inch in the following order: shipment number, container.
- A total of two barcode labels must be placed on each package near the top and on opposite sides. Drums must have a total of two barcode labels, one on top of the drum lid and one on the side near the top.

  ***Note:*** Exceptions to these requirements must be verified with the NNSS Radioactive Waste Management Complex *before* the shipment.

- Labels must be securely attached and able to withstand shipping conditions.
  - Weatherproof (must not deform when wet or fade in the sun)
  - Resistant to tearing, peeling, and cracking
  - Print must remain legible and made with permanent indelible ink.

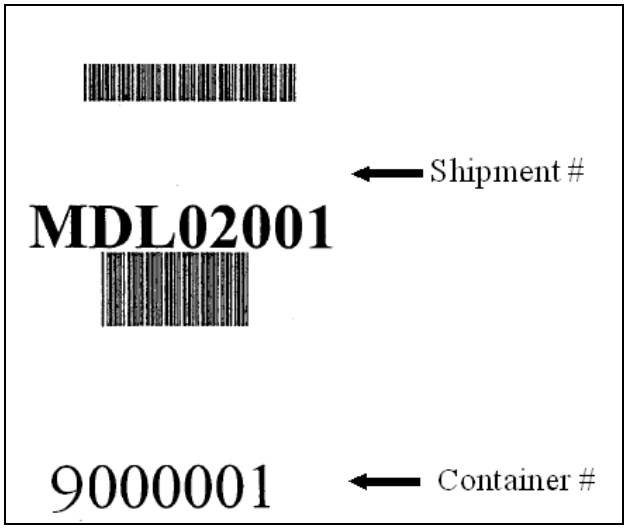


**Fig. 17-2. Barcode label example.**

***Note:*** Example shown in Fig. 17-2 is not the actual size.

A sample barcode must be submitted to the RWAP before the first shipment to ensure that the Radioactive Waste Management System (RWMS) equipment can be used to read the barcode.

## 17.7 Waste Characterization

Generators must characterize waste destined for disposal at the NNSS. When similar requirements are listed in separate regulations, the most stringent must be met. The NNSS will not accept wastes until the generator, through sampling and analysis, acceptable knowledge, or a combination of both, demonstrates the waste to be LLW that meets the NNSS WAC.

Generators must characterize waste with sufficient accuracy to permit proper segregation, treatment, storage, and/or disposal. The characterization methods and procedures employed by the generator must adhere to the requirements in P409, *Waste Management*, and ensure that the physical, chemical, and radiological characteristics of the waste are recorded and known during all stages of the waste management process. Methods selected by the generator for waste characterization must undergo a documented peer review. Data Quality Objectives (DQOs) must be used for identifying characterization parameters and acceptable uncertainty in characterization data.

Generators must document their review and acceptance of the most recent certification audit for the analytical laboratory used.

Waste must be characterized before NNSS profile submittal. Generators must provide WM-SVS with waste characterization documentation that supports development of the NNSS waste profile. Based on the information provided in the WSP, LANL WCO must prepare and submit an NNSS waste profile, which provides NNSS with a summary of waste characterization information. NNSS personnel may require access to this information for review during evaluations of the LANL waste management program. Waste characterization must be traceable to the NNSS waste profile and disposal packages. Isotopic distributions and corresponding activity concentrations must be traceable to the package. Traceability to a package level must be required if characterization is being conducted on an individual basis, but packaged together. Radiological characterization using sampling and analysis, including swipes taken for characterization, must be controlled.

### *17.7.1 Acceptable Knowledge*

Acceptable knowledge is a characterization technique that relies on the generator's knowledge of the physical, chemical, and radiological properties of the materials associated with waste generation processes. It includes knowledge of the fate of those materials, during and subsequent to the process, and associated administrative controls.

Acceptable knowledge sources include, but are not limited to, the following programmatic and waste stream specific materials:

- historic records, including historic analytical data,
- facility maps delineating waste generation areas,
- description of waste generating operations,
- system descriptions,
- plans and drawings,
- areas and/or buildings where each stream is or was generated,
- material inputs, including Material Safety Data Sheets,
- manufacturing specifications,
- mass balance documentation,
- literature searches,
- living memory (documented interviews),
- laboratory notebooks and project reports,

- process logs and batch records, and
- procedures.

Historical data should be routinely verified through controlled analytical methods, such as verification sampling and analysis. However, if the data can successfully undergo a full validation, this verification may not be necessary.

When acceptable knowledge relies on living memory, the individual's knowledge must be documented and signed by both the interviewer and the interviewee. For telephone interviews, a statement outlining relevant information must be signed by the interviewer (and interviewee, if possible). The generator's evaluation must identify uncertainties, inconsistencies, limitations, and usefulness.

Acceptable knowledge can be used instead of sampling and analysis if the acceptable knowledge is of sufficient detail to qualify as acceptable by NNSS. NNSS considers acceptable knowledge acceptable if it is based on detailed information on the waste obtained from existing waste analysis data, studies on similar waste-generating processes, or detailed information relative to the properties of the waste that are known, because of site-specific and/or process-specific factors.

### *17.7.2 Sampling and Analysis*

Generators must conduct a documented evaluation of information collected from acceptable knowledge sources to use for waste characterization. The generator's evaluation must identify uncertainties, inconsistencies, limitations, and sampling and analysis results.

Generators must ensure that all data are scientifically valid, defensible, and of known precision and accuracy. Generators must also identify the physical, chemical, and radiological properties of the waste. When waste streams are characterized by sampling and analysis, the process must be controlled and documented. Propagation of error throughout the sampling and analytical process must be evaluated and controlled when ascertaining usability of data for characterization of the waste. Sampling and analysis results must be recorded on the NNSS waste profile.

Generators must demonstrate that controls are in place to trace each sample number to a specific package number. Sampling and analysis efforts, including verification and confirmatory sampling, should include screening analysis, such as gamma spectroscopy, gross beta, and gross alpha quantification. The sampling and analysis plan must be approved by the WCO *before* conducting the sampling. Generators should determine the appropriate analysis (total versus TCLP) for RCRA hazardous and UHC determinations. These results must be reported in the WSP).

#### *17.7.2.a Data Validation*

Data validation is a comprehensive analysis and review of analytical data conducted against a set of predetermined criteria or qualified standard that indicates relative usability (e.g., completely usable, estimated value, or unusable) for each analytical result. The validation criteria should be developed using the DQO process and depend upon the type(s) of data involved and the purpose for which the data are collected. Data must be validated by technically qualified personnel who are independent of those performing the analysis.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 17. Waste Acceptance at the Nevada National Security Site (NNSS) (Cont.)**
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When sampling and analysis are used as methods of characterization, data validation must be conducted on a portion of chemical and radiological data from the NNSS waste stream, *before* use of the data for characterization purposes.

The LANL waste profile instructions require completion of an analytical results summary (Table 17-9) (see Table B-1 of the NNSS WAC) for inclusion in the NNSS waste profile if data analyses have been performed. Data validation will be performed on a portion of the data used to complete the table. If in subsequent sampling events, variations of analytical results remain less than 80% of the applicable regulatory threshold, revision of Table 17-9 is not required. If the results ever exceed 80% of the regulatory threshold, it will be necessary to revise the table and submit appropriate validation summary reports (case narratives) for the values entered in the revised table.

**Table 17-9. Analytical Results**

| | Statistical Mean | Upper Confidence Limit | | Statistical Mean | Upper Confidence Limit |
|---|---|---|---|---|---|
| **TCLP Metals:** | | | **TCLP Semivolatiles:** | | |
| Arsenic | | | o-Cresol | | |
| Barium | | | p-Cresol | | |
| Cadmium | | | m-Cresol | | |
| Chromium | | | Cresol | | |
| Lead | | | 2.4 Dinitrotoluene | | |
| Mercury | | | Hexachlorobenzene | | |
| Selenium | | | Hexachlorobutadiene | | |
| Silver | | | Nitrobenzene | | |
| **TCLP Volatiles:** | | | Pentachlorophenol | | |
| Benzene | | | 2,4,5-Trichlorophenol | | |
| Carbon Tetrachloride | | | 2,4,6-Trichlorophenol | | |
| Chlorobenzene | | | Hexachloroethane | | |
| Chloroform | | | **TCLP Pesticides and Herbicides:** | | |
| 1,4-Dichlorobenzene | | | Chlordane | | |
| 1,2-Dichloroethane | | | 2,4-D | | |
| Methyl ethyl ketone | | | Endrin | | |
| Pyridine | | | Heptachlor and its epoxide | | |
| **TCLP Volatiles:** | | | **TCLP Pesticides and Herbicides:** | | |
| Tetrachloroethylene | | | Lindane | | |
| Trichloroethylene | | | Methoxychlor | | |
| Vinyl chloride | | | Toxaphene | | |
| 1.1-Dichloroethylene | | | 2,4,5-TP (Silvex) | | |

Validation summary reports must cite the guidelines or procedures used to validate the data and must include, at a minimum, the following information:

- method and kind of analysis with a general discussion of the data set, including preparation, dilutions, initial and continuing calibration, and holding times;
- method blank analysis;
- Laboratory Control Standard (LCS) analysis;
- surrogate spike recoveries;
- data qualifier codes; and
- discussion and/or statement of data quality.

These reports must be attached to the WSP so that they can be submitted to the NNSS.

*17.7.2.b Review by Waste Certification Official (WCO)*

The WCO must review and provide concurrence of procedures and/or revision to all documents that are critical in the certification of LLW streams to be disposed of or shipped to the NNSS.

The WCO must review the sampling and analysis plan for the following:

- The use of and compliance with analytical methods specified in permits or cited in other regulatory or Laboratory documents.
- The methods used to design the sampling and analysis approach, including the use of DQOs or similar method.
- Ensuring that the methods chosen comply with established limits and reporting criteria defined in the WAC.
- The selection of the analytical laboratory and the most recent evaluation of that facility.

### *17.7.3 Gross Radiation Measurements*

Generators using gross radiation measurements must ensure that the measurements correlate with the activity concentration on a consistent basis. Radionuclide distributions in the waste stream must be initially determined and periodically verified through direct measurements or sampling and analysis. Generators must document the methods used to develop scaling factors that relate gross radiation measurements to the activity concentration. When developing scaling factors, generators must consider the waste package and detector geometry, shielding and attenuation effects, and the energy spectra and decay schemes of the radionuclides in the waste.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 18. TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP) (Page 1 of 7)**

The TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP) receives and treats radioactive and industrial wastewaters with a radionuclide content of 0.032 curie per liter or less, and a Transuranic (TRU) content of 10 nanocuries per liter or less. These wastewaters cannot contain Toxic Substance Control Act (TSCA) or Resource Conservation and Recovery Act (RCRA) constituents as defined in 40 CFR, *Protection of Environment*, and have temperature, volume, and pH restrictions. The concentrations of metals and certain other contaminants are also limited, as set forth in this attachment.

Most of this wastewater is generated at TA-53, and is received at the RLWTP through a network of buried pipelines. Wastewater from other LANL generators is transported to the TA-53 RLWTP by truck. The Waste Acceptance Criteria (WAC) outlined in this attachment are applicable to all wastewaters transported to the TA-53 RLWTP, whether by underground piping or by truck.

Criteria for metals and other potential hazardous constituents are established so that wastewaters received at the TA-53 RLWP are below Environmental Protection Agency (EPA) levels for RCRA characteristic hazardous wastes. Criteria for radionuclides are derived from (1) air emission calculations based on the maximum annual design basis flow rate (280,000 gallons) and historical sampling data for the Area A and Weapons Neutron Research (WNR) tanks, and (2) radionuclides that constitute greater than 1% of the total activity and greater than 1% of the Category 3 threshold limit of the cooling water system for the 1L tungsten target located at the Lujan Center (assuming a maximum annual discharge of 3,000 gallons). The activity and radionuclide inventory in the Radioactive Liquid Waste (RLW) from the 1L tungsten target cooling water system is based on the predicted activity of radionuclides within the target system after one year of beam operation, an assumed conservative corrosion rate (23 mils per year), and an assumed removal efficiency (90%) associated with the ion exchange columns within the cooling water system.

## 18.1 Facility Requirements For Connecting to the TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP)

Each sink and drain connected to the TA-53 RLWTP must be posted with a sign informing users of the requirements for disposing of wastewater down the drain. Signs may be obtained from the Radioactive Liquid Waste Treatment Facility (RLWTF) at (505) 667-4301.

Pipelines within buildings that are connected to the TA-53 RLWTP should be labeled "Radioactive Waste Line."

### 18.2 Waste Stream Profile (WSP)

Only wastewater having an approved WSP may be discharged or transported to the TA-53 RLWTP. Instructions for completing a WSP are included in the WCATS User's Manual. The waste generator is responsible for completing a new WSP. The WSP must include information with sufficient accuracy regarding the waste's physical, nonradiological, and radiological characteristics to evaluate compliance with the TA-53 RLWTP WAC.

Upon completion, the WSP is to be sent to the Waste Acceptance group. A copy of the WSP will be sent to the generator's Waste Management Coordinator (WMC) upon acceptance or rejection of the waste at the TA-53 RLWTP. Contact your WMC for specific information related to the status of a waste profile. Any significant modification to the quality or quantity of the industrial waste water discharge requires submission of an amended waste profile as set forth above.

### 18.3 Waste Acceptance Criteria Exception Form (WEF)

Some waste streams that do not meet the WAC may be acceptable for treatment at the RLWTP. Also, a temporary change in the waste stream requires that the RLWTP be notified. The documentation for handling both of these situations is a WEF (Form 1973, *Waste Acceptance Criteria Exception Form*). The WEF must be approved by RLWTP personnel and in some instances, the TA-53 Facility Operations Director (FOD) before the new waste stream or the modified waste stream can be sent to the RLWTP. The WEF (Form 1973) may be obtained by contacting your WMC. An approved (i.e., signed) WEF (Form 1973) must be electronically attached to the WSP before submittal of the WSP, in order for the WSP to be approved for use. In addition, if adequate Acceptable Knowledge (AK) and/or analytical data are not available to clearly demonstrate the waste stream meets RLWTP acceptance criteria, the generator may provide the RLWTP Process Engineer with the available AK/data so the RLWTP Process Engineer may make an acceptance determination.

### 18.4 Wastewater Acceptance Criteria (WAC)

For acceptance at the TA-53 RLWTP, wastewater must meet the criteria outlined in this section. Specifically, certain wastewaters are unacceptable for treatment at the RLWTP (Table 18-1), wastewaters must not have concentrations of radioactive constituents and metals in excess of concentrations given in Tables 18-2 and 18-3, and wastewaters must meet other restrictions set forth in this section.

If a waste stream includes any of the constituents listed in Table 18-1, or exceeds limits set forth in Table 18-2, Table 18-3, or if the wastestream exceeds the total quantity volume of 10,000 gallons, or as set forth in this section, the generator must complete Form 1973, *Waste Acceptance Criteria Exception Form*, and submit the WEF along with the waste profile. The RLWTP Process Engineer, and in some instances the TA-53 FOD, will then determine if the waste stream can be accepted for treatment.

### *18.4.1 Unacceptable Wastewaters*

Wastewaters with characteristics set forth in Table 18-1 are unacceptable for discharge to the RLWTP.

| **Table 18-1. Wastes that are Unacceptable for Treatment at the TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP) in any quantity unless otherwise specified or exempted through the WEF process. Except as specified for certain metals, exhibiting toxicity characteristic, contained in Table 18-3.** | |
|---|---|
| Nonradioactive Constituents | Resource Conservation and Recovery Act (RCRA)-regulated characteristic waste (D001, D002, D003, as defined in 40 CFR 261.21, *Identification and Listing of Hazardous Waste, Characteristic of ignitability,* 40 CFR 261.22, *Identification and Listing of Hazardous Waste, Characteristic of corrosivity*, and 40 CFR 261.23, *Identification and Listing of Hazardous Waste, Characteristic of reactivity*) |
| | RCRA-regulated toxic metal waste (D004 – D011) (40 CFR 261.24, *Identification and Listing of Hazardous Waste, Toxicity characteristic*) |
| | RCRA-regulated toxic organic waste (D012 – D043) (40 CFR 261.24) |
| | RCRA-regulated listed waste (F-, K-, P-, U-listed) (40 CFR 261.31, *Identification and Listing of Hazardous Waste, Hazardous wastes from non-specific sources,* 40 CFR 261.32, *Identification and Listing of Hazardous Waste, Hazardous wastes from specific sources*, and 40 CFR 261.33, *Identification and Listing of Hazardous Waste, Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof*) |
| | DDT, dioxins, or pesticides at any detectable concentration determined by an approved Environmental Protection Agency (EPA) method |
| | Toxic Substance Control Act (TSCA) waste as defined in 40 CFR 761, *Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions,* and 40 CFR 766, *Dibenzo-Para-Dioxins/Dibenzofurans*, including but not limited to waste containing PCBs. |
| Other | Biological or microorganism waste |
| | Oils, greases, detergents and surfactants that may inhibit evaporation or develop films in the evaporation basins, in concentrations greater than 100 mg/L. |
| | Sanitary waste (except for rad decontamination showers and sinks) |
| | Sludges or solids |
| | Dyes and scintillation cocktails |

### *18.4.2 Radionuclide Content*

The maximum allowable radionuclide concentration (defined as the sum of gross alpha, gross beta, and gross gamma **or** the sum of individual alpha-, beta-, and gamma-emitting radionuclides known to be in the wastewater) for wastewater discharged to the TA-53 RLWTP is 3.2E–02 Ci/L. In addition, the maximum allowable TRU radionuclide concentration (defined as the sum of all radionuclides with atomic numbers larger than 92) is 10 nanocuries per liter. Limits for individual radionuclides are listed in Table 18-2. Radionuclides that make up greater than 1% of the total activity in the wastewater and have half-lives greater than 30 days must be reported on the waste profile. Total activity of the wastewater must also be reported.

### *18.4.3 Metals*

Liquid waste streams that contain metals below the concentration limits in Table 18-3 are acceptable for discharge to the TA-53 RLWTP.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 18. TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP) (Cont.) (Page 4 of 7)**

**Table 18-2. Limits on Radionuclides Acceptable for Discharge to the TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP)**

| Radionuclide | Maximum Allowable Activity (Ci/L) |
|---|---|
| Be-7 | 9.0E–04 |
| Co-56 | 8.8E–06 |
| Co-57 | 2.0E–05 |
| Co-58 | 3.5E–05 |
| Co-60 | 5.7E–06 |
| Gd-148 | 3.9E–07 |
| H-3 | 3.5E-03 |
| Hf-172 | 9.1E–05 |
| Hf-173 | 3.30E–04 |
| Hf-175 | 4.1E–04 |
| I-125 | 5.7E–07 |
| I-126 | 1.1E–07 |
| Lu-170 | 2.6E–04 |
| Lu-171 | 3.0E–04 |
| Lu-172 | 1.2E–04 |
| Mn-54 | 4.2E–05 |
| Na-22 | 1.2E–05 |
| Rb-83 | 1.3E–06 |
| Rb-84 | 1.0E–06 |
| Sc-46 | 6.0E–06 |
| Se-75 | 3.4E–07 |
| Sr-85 | 6.0E–08 |
| Ta-173 | 2.7E–04 |
| Ta-174 | 3.1E–04 |
| Ta-175 | 3.6E–04 |
| Ta-176 | 4.5E–04 |
| Ta-177 | 4.7E–04 |
| Ta-179 | 2.8E–04 |
| Ta-182 | 1.5E–04 |
| Tm-166 | 2.0E–04 |
| W-176 | 2.9E–04 |
| W-177 | 3.3E–04 |
| W-178 | 5.6E–04 |
| W-181 | 1.6E–03 |
| W-185 | 4.4E–03 |
| W-187 | 9.0E–03 |
| Y-88 | 2.4E–07 |
| Yb-166 | 1.9E–04 |
| Yb-169 | 2.7E–04 |
| Zn-65 | 1.5E–06 |
| Sum of All radionuclides | 3.2E–02 |
| Sum of transuranic radionuclides | 1.0E–08 |

**Table 18-3. Limits on Metals Acceptable for Discharge to the TA-53 Radioactive Liquid Waste Treatment Plant (RLWTP)**

| Metal | Allowable Concentration (mg/L) |
|---|---|
| Arsenic (D004 | <2.5 |
| Barium (D005) | <50 |
| Cadmium (D006) | <.5 |
| Chromium (D007) | <2.5 |
| Lead (D008) | <2.5 |
| Mercury (D009) | <.1 |
| Silver (D011) | <2.5 |
| Selenium (D010) | <.5 |

### *18.4.4 Other Characteristics*

Temperature: The maximum allowable temperature of wastewater discharged to the TA-53 RLWTP is 60°C (140°F). Temperatures above 60°C (140°F) will cause expansion and damage to the collection system.

pH: Wastewater must have a pH between 6.1 and 9.0 to be released to the TA-53 RLWTP.

Total Suspended Solids (TSSs): Waste streams containing solids may cause problems with in-line blockage and will ultimately settle out within the evaporation basins. The maximum allowable TSS level is 100 mg/L.

Water Content: Waste streams with a water content of less than 95% are not acceptable for discharge to the TA-53 RLWTP. Volume: A wastestream may not be discharged to the TA-53 RLWTF when total volume exceeds 10,000 gallons. A WEF (Form 1973, *Waste Acceptance Criteria Exception Form*) is required for discharges greater than this.

## 18.5 Transported Wastewaters

Wastewater may be transported to the TA-53 RLWTP in containers (such as Tuff Tanks™ and 55-gallon drums) or tanker trucks, in compliance with applicable Department of Transportation (DOT) regulations. However, wastewater cannot be released directly into the evaporation tanks and must be collected in the RLWTF tanks and then distributed to the appropriate evaporation tank.

The generator is responsible for ensuring that an approved waste profile and on-line Waste Disposition Request (WDR), found in WCATS, are completed before transport. Contact your WMC. Either the waste generator or the WMC must be present at the time and place of pickup to ensure that the correct items are transported. The generator must also provide the necessary equipment, such as forklifts or pumps, required for safely loading and unloading the wastewater.

The RLWTP does not treat solid waste or sludge. Any solid particles in excess of the value listed in Table 1-4 that have settled to the bottom of the liquid waste container will not be accepted for treatment at the RLWTF. The generator is responsible for the solid particles left over in the liquid waste container.

### *18.5.1 Tanker Truck Operations*

Waste transported in the RLWTP tanker truck must:

- qualify as a DOT Exempt Classification or as a limited quantity of radioactive materials as defined by 49 CFR 173.425, *Table of Activity Limits—Excepted Quantities and Articles*, and must
- be located in an area accessible by a tanker truck.

The generator must:

- coordinate the date, time, and location with the RLWTP WMC (667-4301),
- ensure that the waste generator's WMC is present at the time and place of pickup, and
- provide any equipment required for safely transferring the waste (for example, forklifts, auxiliary pumps).

### *18.5.2 Flatbed Truck Operations*

Generators are responsible for their waste containers. After waste is disposed of at the RLWTF, RLWTF personnel triple-rinse the containers and survey them for surface contamination. The generator is responsible for retrieval and disposal of the empty containers. The container and residual waste may be transported back to the generating facility after proper characterization is complete and the necessary transportation papers are approved. If the container and residual waste prove to be a Class 7 waste as defined in 49 CFR 173.403, *Shippers-General Requirements for Shipments and Packagings, Definitions*, then the generator or WMC should complete Form 1586, *Radioactive Materials Transfer*, and coordinate with Operations Support-Packaging and Transportation (OS-PT) for approval and transportation of material.

Waste transported to the RLWTP in containers by flatbed truck must be transported in any of the following containers:

- Tuff Tanks™ or other DOT-approved portable containers. Tuff Tanks™ are not to be filled above the maximum fill line. If there is no maximum fill line, they must be filled to at least 60% and no more than 90% of capacity.
- DOT-approved, 55-gal. or 35-gal. metal, closed-head drums. Drums are to be filled to at least 60% and no more than 90% of capacity.
- Glass bottles or plastic carboys (not to exceed 5-gal. capacity) with fitted, screw-type caps.

Glass bottles or plastic carboys must not have any bottom outlets and must be overpacked in accordance with the appropriate DOT packaging authorization and packing group. If a liquid waste is not regulated by DOT, liquid waste transported in these containers must still be overpacked in a metal or plastic drum. The overpack must contain enough absorbent to absorb all of the liquid waste.

## 18.6 Nonconformances

RLWTP personnel will periodically audit generator documentation, such as waste profiles and WEFs (Form 1973, *Waste Acceptance Criteria Exception Forms*) against actual discharges to the RLWTP. In addition, RLWTP personnel reserve the right to perform scheduled or non-scheduled monitoring of discharges from radioactive wastewater-generating facilities.

The RLWTP Process Engineer will issue a nonconformance report in accordance with P330-6, *Nonconformance Reporting,* to any generating group that discharges or transports a waste stream to the RLWTP that does not meet the criteria outlined in this attachment and for which a WAC exception was not approved by the RLWTP. The issues and corrective action management process described in P322-4, *Laboratory Performance Feedback and Improvement Process*, must be used to document the root cause, corrective action and actions to preclude recurrence, and the results will be submitted by the generating group to the RLWTF. Environmental Protection-Water Quality and RCRA (ENV-RCRA) will also be notified of the nonconformance.

## 18.7 Notification

The generating group must notify the RLWP in writing of any of the following:

1. Changes to the generator's waste profile and WEF (Form 1973, *Waste Acceptance Criteria Exception Form*).
2. Significant modification to the quality or quantity of the industrial waste water discharge.
3. Discharge into the RLWP of any substance which, if otherwise disposed of, would be a hazardous waste under 40 CFR 261, *Identification and Listing of Hazardous Waste*.

**No: P930-1 LANL Waste Acceptance Criteria** [Back]
**Attachment 19. Non-Hazardous, Non-Radioactive Scrap Metal (Page 1 of 4)**

With the exception of reuse or recycle within the Department of Energy (DOE) Complex (see Attachment 8, *Other Low-Level Waste (LLW)*, Section 8.8), the recycling of scrap metal removed from radiological contaminated areas has been suspended in accordance with the DOE Secretarial Memorandum of July 13, 2000. However, DOE has authorized the direct disposal of nonhazardous, nonradioactive scrap metal in off-site industrial landfills. These Waste Acceptance Criteria (WAC) are applicable to scrap metal destined for recycling or disposal. Scrap metal that does not meet the requirements of this document must be disposed of as radioactive or mixed waste (see appropriate WAC sections).

The scrap metal recycling suspension applies to any Area within Radiological Control Areas (RCAs) that must be posted as a

- Radiation Area,
- High Radiation Area,
- Very High Radiation Area,
- Contamination Area,
- High Contamination Area, or
- Airborne Radioactivity Area.

Metals from activation areas that are potentially volumetrically contaminated may not be recycled. Volumetrically contaminated metals should be managed separately because their disposal costs may be significantly higher than that for other scrap metals.

Nonhazardous, nonradioactive scrap metal is not subject to the recycling suspension and may be recycled if it originates in an Area with any of the following postings:

- Radiological Controlled Areas (unless from an Area with one of the above postings),
- Radiological Buffer Zones,
- Radioactive Material Areas,
- Soil Contamination Areas,
- Fixed Contamination Areas,
- Underground Radioactive Material Areas, or
- Hot Job Exclusion Areas.

Certain other conditions also exempt nonhazardous, nonradioactive scrap metals from the recycling suspension. These conditions are described as follows:

- Clean metal items that can be reused should be sent to LANL Salvage Operations for reuse.
- Metallic items that are in a fully sealed, protective enclosure, such as ballasts, light bulbs, and circuit boards, are not subject to the recycling suspension and should be recycled. Visit the recycling web page for detailed information about these items: http://int.lanl.gov/recycle.
- If a radiological hazard Area has been down-posted to reflect a lesser radiological hazard for any reason other than the removal of metal, then nonhazardous, nonradioactive metal originating from these areas may be recycled.

## 19.1 Waste Determination

In accordance with P409, *Waste Management*, a generator of bulk scrap metal must make a hazardous waste determination at the time the waste is being generated.

Radiological characterization must comply with Free Release Limits in accordance with P121, *Radiation Protection,* Radiation Protection-Health Physics Operations (RP-1) procedures and the Waste Acceptance Criteria regarding allowable radiological levels of the off-site Treatment, Storage, and/or Disposal Facility (TSDF) to which the waste is destined for treatment and/or disposal.

## 19.2 Waste Form

### *19.2.1 Acceptable Forms*

The following types of metal are acceptable for disposal or recycling:

- Iron and steel,
- Aluminum,
- Metal building debris,
- Metal duct work, and
- Similar type metal items.

### *19.2.2 Restrictions*

The waste types or materials in the following list must not be packaged with nonhazardous, nonradioactive scrap metal destined for recycling or disposal at an industrial landfill:

- Volume-contaminated scrap metal either from activation or from the mixing of radioactive material into the item itself,
- Hazardous waste,
- New Mexico special waste,
- Tritium-contaminated scrap metal,
- Toxic Substance Control Act (TSCA)-regulated Polychlorinated Biphenyl (PCB) waste,
- Asbestos-containing material,
- LLW,
- Transuranic (TRU) waste,
- Universal waste, or
- Classified shapes.

The Generator must provide RP-1 with sample data or an approval for recycle notice before requesting removal and service of the metal for recycling in a roll-off bin. Requests for service can be made by e-mailing wastenot@lanl.gov.

**No: P930-1 LANL Waste Acceptance Criteria**
**Attachment 19. Non-Hazardous, Non-Radioactive Scrap Metal (Cont.) (Page 3 of 4)**

## 19.3 Container Requirements

Utilities and Infrastructure (U&I) must provide roll-off containers for the loading and transport of scrap metal for recycle. If a waste generator has only a small volume of nonhazardous, nonradioactive scrap metal for recycling, the generator should transport it directly to the Technical Area (TA)-60-311 Material Recycling Facility (MRF).

## 19.4 Package Weight

Packages of waste must not exceed the rated capacity of the packaging container or the gross weight of the U&I supplied roll-off container. The transport vehicle with the container and waste must not exceed 90% of the vehicle rating.

## 19.5 Limits on Removable Contamination and Surface Activity

A waste generator releasing scrap metal must provide Waste Projects and Services-Hazardous Mixed Low Level Waste (WPS-HMLW) with reasonable assurance that the scrap metal has been free-released from the RCA. The waste generator must provide proof that no residual radioactive material is detectable above background on the metal. This must be done using standard procedures and commercially available technology. A waste generator releasing bulk scrap metal for direct disposal must follow the requirements for releasing material into uncontrolled areas as stated P121, *Radiation Protection*. Each item within the bulk scrap metal shipment must be released using an item removal log or Health Physics Release (HPR) tag. Copies of these documents must accompany the on-line Waste Disposition Request (WDR), found in WCATS, for scrap metal destined for disposal.

## 19.6 Documentation

### *19.6.1 Survey Records*

Records for releasing bulk scrap metal must indicate the material, the date on which the release survey was performed, the individual who performed the survey, the type and the identification number of the survey instrument used, and the survey results. In addition, the records must include a measurement of the background radiation in the Area where the survey was performed and the minimum detectable activity for the instrument.

### *19.6.2 Acceptable Knowledge Statement*

A waste generator must include acceptable knowledge documentation that is given a unique identifier on the Waste Stream Profile (WSP) and may attach the document to the WSP. They are liable for retaining this information for auditing purposes and/or Treatment, Storage, and/or Disposal Facility (TSDF) requests. The acceptable knowledge statement must document that due diligence was used in evaluating the scrap metal and that this included operational records, operating history, and process knowledge. A waste generator must also provide an acceptable knowledge statement documenting that due diligence was used in evaluating the scrap metal and that this included operational records, operating history, and process knowledge.

### *19.6.3 Acceptable Knowledge Statement for Inaccessible Areas*

For the portion of specific items that are inaccessible, a separate acceptable knowledge statement signed by the generator must be submitted with the WSP. The acceptable knowledge statement must demonstrate that inaccessible surfaces of the item are within authorized limits based on a case-by-case evaluation, history-of-use documentation, and measurement documentation.

### *19.6.4 Waste Stream Profile (WSP) and On-Line Waste Disposition Request (WDR)*

A waste generator with assistance from his or her Waste Management Coordinator (WMC) is required to submit a WSP and on-line WDR, found in WCATS, for approval from the Waste Disposition Project (WDP) for all bulk nonhazardous, nonradioactive scrap metal designated to be sent off-site for direct disposal. In the waste/process description section of the WSP, the generator must identify that the waste is bulk scrap metal free released from an RCA for direct disposal in an industrial landfill. For each shipment of bulk scrap metal for disposal, a WMC must submit the on-line WDR. The generator must include with the on-line WDR either an item removal log or a copy of the HPR tag completed by RP-1 for each item covered by the on-line WDR.

## 19.7 Package Marking and Labeling

When the container departs the generator site, the HPR tag for the container must be given to the driver. The tag must not be attached to the container.

## 19.8 Arranging Transfer of the Waste

When the on-line WDR is approved and a generator is ready to load the bulk scrap metal, the generator must contact WPS-HMLW to arrange for the delivery of the roll-off container. Once the container is loaded, the generator must contact WPS-HMLW to arrange for transport and disposal.

## 19.9 Cost

A generator must provide program and cost codes as part of the on-line Waste Profile Charge Code Form, found in the Waste Management Database Applications. The generator must be charged actual costs to the generator's program and cost codes for the disposal of the bulk scrap metal.

## 19.10 Verification Monitoring Program

As required by DOE O 5400.5, *Radiation Protection of the Public and the Environment*, WPS-HMLW must conduct a verification monitoring of each shipment of bulk nonhazardous, nonradioactive scrap metal being sent for disposal. Before departure from LANL, bulk scrap metal being transported for disposal must be monitored through a bulk portal-type monitor. If the transport vehicle fails to meet verification monitoring program parameters, the shipment must be returned to the generator for correction and the on-line WDR, must be canceled. Bulk shipments of non-hazardous, non-radioactive metal destined for recycling also will be monitored through a bulk portal-type monitor before departure from LANL.

## IMPORTANT

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