1 of 2

Environmental Protection Department

Waste Certification Program

Application to Ship Nonmixed Transuranic Waste to the Nevada Test Site for Interim Storage

Prepared for
Lawrence Livermore National Laboratory
by
Gutierrez-Palmenberg, Inc.
under Purchase Order B160619

December 1993

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PUBLICATION RECORD

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	Title	Effective Date	Nature of Change
0	Application to Ship Nonmixed Transuranic Waste to the Nevada Test Site For Interim Storage	11/30/93	

DEPARTMENT OF ENERGY APPROVAL SIGNATURE

The signature below attests that the information within this application is correct and that the waste streams to be shipped shall meet the U.S. Department of Energy (DOE), Nevada Operations Office (NV), NVO-325 (Rev. 1), "Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements."

Accepted By: _____

Daniel N. Nakahara
Program Manager, Waste Management Operations
San Francisco Operations Office, DOE/SF

Date

APPROVAL SIGNATURES

The signatures below attest that the information within this application is correct and that the waste streams to be shipped shall meet the DOE/NV, NVO-325 (Rev. 1), "Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements."

Approved
for use:

Dennis Fisher
Associate Director for Plant Operations

Date

Issued:

Robert Fischer
Waste Certification Official

Date

Concurred:

John Palmer
Quality Assurance Officer

Date

Concurred:

Harry Galles
Environmental Protection Department Head

Date

Concurred:

Keith V. Gilbert
Hazardous Waste Management Division Leader

Date

Concurred:

Susi Jackson
Operations and Regulatory Affairs Division Leader,
Environmental Compliance Officer

Date

Concurred:

Robert Garrett
Traffic Manager

Date

Concurred:

Roy Kearns
Waste Management Operations
San Francisco Operations Office, DOE/SF

Date

Concurred:

Donald F. Alves
Acting Manager, Plutonium Facility

Date

Concurred:

Richard C. Baxter
Materials Management Section Leader

Date

Concurred:

Mary Singleton
Heavy Element Facility Manager

Date

Concurred:

Dennis Barrett
HMPTS Assurance Officer

Date

CONTENTS

I. GENERATOR INFORMATION	I-1
II. WASTE CHARACTERIZATION PROGRAM	II-1
III. WASTE STREAM INFORMATION	III-1
A. Glove Box Waste	III-2
B. Solidified Liquid Waste	III-30
C. Metal Scrap Waste	III-59
D. ISAM Program Salt Block Waste	III-87
VI. WASTE CERTIFICATION PROGRAM	IV-1
V. EXEMPTION REQUESTS	V-1
VI. PROCEDURES AND SUPPORTING DOCUMENTS	VI-1
VII. REFERENCES	VII-1
VII. ACRONYMS	VIII-1
APPENDIX A: LLNL TRU Waste Program Certification and Quality Assurance Plan	BOUND SEPARATELY

FIGURES

Figure 1	LLNL Management Organization that Supports the TRU Waste Program ..	I-2
Figure 2	LLNL Waste Management Organization	I-3
Figure 3	LLNL Waste Certification Organization	I-6
Figure 4	Waste Certification Flow Diagram - BCLA-TRU000001	III-3
Figure 5	Waste Stream Characterization Data Sheet - BCLA-TRU000001	III-26
Figure 6	Three-Year Waste Shipment Forecast - BCLA-TRU000001	III-28
Figure 7	Waste Certification Flow Diagram - BCLA-TRU000002	III-31
Figure 8	Waste Stream Characterization Data Sheet - BCLA-TRU000002	III-55
Figure 9	Three-Year Waste Shipment Forecast - BCLA-TRU000002	III-57
Figure 10	Waste Certification Flow Diagram - BCLA-TRU000003	III-60
Figure 11	Waste Stream Characterization Data Sheet - BCLA-TRU000003	III-83
Figure 12	Three-Year Waste Shipment Forecast - BCLA-TRU000003	III-85
Figure 13	Waste Certification Flow Diagram - BCLA-TRU000004	III-88
Figure 14	Waste Stream Characterization Data Sheet - BCLA-TRU000004	III-111
Figure 15	Three-Year Waste Shipment Forecast - BCLA-TRU000004	III-113

I. GENERATOR INFORMATION

A. Signature Page

The signatures on page iv-vi attest that the information within this application is correct and that the waste streams to be shipped shall meet the DOE/NV Waste Acceptance Criteria, NVO-325 (Rev. 1).

B. Generator/Facility Name and Location

Street address:

Lawrence Livermore National Laboratory
7000 East Avenue
Livermore, CA 94550-9900

Post office box address:

Lawrence Livermore National Laboratory
P. O. Box 808
Livermore, CA 94551-9900

C. EPA Number - CA2890012584

D. DOE Operations/Area Office and Contacts

The cognizant DOE Operations Office for administration of Lawrence Livermore National Laboratory (LLNL) activities is the San Francisco Operations Office (DOE/SF). DOE/SF offices are located on-site at the LLNL, Livermore, California. Daniel N. Nakahara is the DOE/SF key contact for waste management operations.

Daniel N. Nakahara
Program Manager
Waste Management Operations
U.S. Department of Energy
Lawrence Livermore National Laboratory
Post Office Box 808, L-574
Livermore, CA 94551-9900

Commercial: (510) 423-8394
FAX: (510) 422-0832

Figure 1. LLNL Management Organization that Supports the TRU Waste Program

*WCO Reports to ASSOCIATED DIRECTORS FOR PLANT OPERATIONS when Performing Certification Activities

Figure 2. LLNL Waste Management Organization

E. Contractor Name and Contacts

LLNL is operated by the University of California for the Department of Energy. Figures 1 and 2 depict the LLNL Management Organization and Waste Management Organization. Key contacts for LLNL Waste Management operations are:

Keith V. Gilbert, Division Leader
Hazardous Waste Management Division
Lawrence Livermore National Laboratory
Post Office Box 808, L-621
Livermore, CA 94551-9900

Commercial: (510) 423-5909
FAX: (510) 422-3469

Charlie Patterson
Waste Operations Section Leader
Hazardous Waste Management Division
Lawrence Livermore National Laboratory
Post Office Box 808, L-620
Livermore, CA 94551-9900

Commercial: (510) 423-8329
FAX: (510) 294-4196

F. Waste Certification Official and Alternate

The LLNL Waste Certification Organization is depicted in Figure 3. Key contacts for LLNL waste certification operations are:

Waste Certification Official (WCO)

Robert Fischer
Waste Certification Program Manager
Waste Certification Program
Lawrence Livermore National Laboratory
Post Office Box 808, L-579
Livermore, CA 94551-9900

Commercial: (510) 422-3004
FAX: (510) 294-4196

Waste Package Certifier (WPC)

Kem Hainebach
Waste Certification Engineer
Waste Certification Program
Lawrence Livermore National Laboratory
Post Office Box 808, L-579
Livermore, CA 94551-9900

Commercial: (510) 422-4572
FAX: (510) 294-4196

G. Justification for Interim Storage at the Nevada Test Site

LLNL generates defense-related mixed and nonmixed Transuranic (TRU) waste that must be stored on a continuous basis. The LLNL TRU Waste Certification Program was established to assure that TRU waste generated and packaged by LLNL can be certified for acceptance at the Waste Isolation Pilot Plant (WIPP) for disposal and that nonmixed TRU waste can be certified for acceptance at the Nevada Test Site (NTS) for interim storage. DOE Order 5820.2A mandates that TRU waste cannot be disposed on site. All TRU waste must eventually be shipped to the WIPP for disposal.

LLNL's stored TRU waste is nearing current storage limits and the lack of available storage capacity, either at LLNL or at the Nevada Test Site, could endanger the continuance of vital national defense activities.

H. Waste Minimization Plan

The document, *LLNL Waste Minimization Plan* (UCRL-21215-91), submitted to DOE in May 1991, has been developed in accordance with DOE Orders 5400.1, 5400.3, and 5820.2A, and the Resource Conservation and Recovery Act (RCRA), to establish a coordinated effort to reduce the amount of waste produced at LLNL. The policy addresses those activities and methods that are or will be employed to reduce the quantity or toxicity of hazardous, radioactive, and mixed waste generated at the facility. A copy of the LLNL Waste Minimization Plan is on file at LLNL and is available for review by DOE/NV upon request.

I. Funding Method

The LLNL will provide project funding through Contract No. W-7405-ENG-48, under which the University of California operates the Lawrence Livermore National Laboratory for the Department of Energy. LLNL will prepay for the estimated waste volume by at least one fiscal quarter. LLNL will prepare a purchase order based on a minimum of four quarters estimated waste volume, consistent with the Three-Year Waste Shipment Forecast, at the prevailing charge per cubic foot.

LLNL will contact the REECo Programs, Plans & Budget Department to coordinate financial arrangements. Purchase orders will be sent to Reynolds Electrical & Engineering Co., Inc. (REECo), addressed as follows:

Reynolds Electrical & Engineering Co., Inc.
ATTN: Manager
Programs, Plans & Budget Department
Work Order Section
Post Office Box 98521
Las Vegas, NV 89193-8521

* Certification Reports to Associated Directors for Plant Operations when Performing Certification Activities

Figure 3. LLNL Waste Certification Organization

II. WASTE CHARACTERIZATION PROGRAM

Waste Isolation Pilot Plant Permit Requirements:

RCRA Waste Determination:

Generators of TRU waste must determine whether their waste is regulated by RCRA as a hazardous waste. The determination is based on whether representative samples or process knowledge of the solid waste indicates that it is specifically identified or listed in 40 CFR Part 261. Each hazardous waste must be assigned one or more of the applicable EPA hazardous waste codes. Only those waste codes included in the WIPP RCRA Part A Permit Application can be managed at the WIPP. Wastes that exhibit the characteristics of Ignitability (D001), Corrosivity (D002), or Reactivity (D003), as defined in 40 CFR 261, will not be accepted at the WIPP.

WIPP RCRA Permit Application Requirements and QA Project Plans (QAPjPs):

The Waste Analysis Plan (WAP) included in the WIPP RCRA Permit Application specifies the waste analysis requirements applicable to the TRU mixed wastes to be shipped to WIPP. These include the specific sampling and analysis requirements specified in the No Migration Determination (NMD) issued by the EPA. The QAPjP addresses analysis and sampling requirements to show compliance with the NMD criteria. The QAPjP establishes site-specific procedures for sampling and analytical protocols and Quality Assurance/Quality Control (QA/QC) guidances for the WIPP Test Phase. The additional information required by 40 CFR 265.13 and 264.13, such as test methods, sampling methods, frequency, and accuracy, are required to be addressed in the site-specific QAPjPs.

Waste generator and/or storage sites have the responsibility for sampling and analyzing headspace gases to demonstrate compliance with the waste characterization requirements in the NMD. The headspace gas samples shall be collected and analyzed in accordance with procedures specific in each site's QAPjP. The QAPjP contains a more detailed explanation of responsibilities for various organizations involved in the waste characterization program.

The waste characterization requirements of the NMD are:

Headspace Gases

- Flammability Requirements (No Migration Determination)
 - Verify that any waste package to be emplaced in the WIPP during the experimental period does not exceed 50 percent of the lower explosive limit (LEL) in any layer of confinement for hydrogen (H₂) and methane (CH₄), when potentially flammable volatile organic compounds (VOCs) as a class are <500 ppm. A layer of confinement is defined as a bagging layer that has waste inside that layer. The methodology for demonstrating compliance with this flammability requirement is presented in the QAPjP.

- If the potentially flammable VOCs occur in the headspace in concentrations greater than 500 ppm as a class, then a flame test must be performed prior to acceptance of that waste package for emplacement underground in the WIPP for experimental purposes. (The 500 ppm potentially flammable VOC limit in the TRUPACT-II SARP is generally more restrictive than this requirement. If flammable VOCs exceed 500 ppm in the headspace of a waste package, that waste package cannot be shipped under the current U.S. Nuclear Regulatory Commission (NRC) Certificate of Compliance.)
- If the summed value for potentially flammable VOCs exceeds 500 ppm, a theoretical LEL shall be calculated using the concentrations of the flammable VOCs plus hydrogen and methane, as outlined in the QAPjP. (DOE/WIPP-069 [Rev. 4], Section 3.4.7.3)
- Nonflammable VOCs (Comparability)
 - The No Migration Determination mandates that any waste package that is sent to the WIPP must meet the requirement that the headspace concentration within a package does not exceed two times (2X) the maximum concentration for five nonflammable VOCs. This requirement is designed to ensure that the wastes to be emplaced in the WIPP are in fact similar to the wastes described in the No-Migration Variance Petition (NMVP). The five nonflammable VOCs are: Carbon Tetrachloride; Methylene Chloride; 1,1,1-Trichloroethane; Trichloroethylene; and 1,1,2-Trichloro-1,2,2-Trifluoroethane.
 - The five nonflammable compounds and their 2X maximum concentration limits are reported in the WIPP RCRA Part B Permit Application and the methodology for demonstrating compliance is presented in the QAPP
- Nonflammable VOCs (No-Migration Determination)
 - The NMD mandates that any waste package that is sent to the WIPP must meet the requirement that the headspace concentration within a package does not exceed ten times (10X) the average concentration of three nonflammable VOCs. (Two of the five compounds listed above do not have to meet this requirement.) The three nonflammable VOCs that must meet this requirement are: Carbon Tetrachloride; Methylene Chloride; and Trichloroethylene.
 - The three nonflammable compounds and their 10X average concentration are reported in the WIPP RCRA Part B Permit Application and the methodology for demonstrating compliance is presented in the QAPjP.

Sludges

In addition to the headspace analyses specified above, sludges shall be analyzed for total VOCs and toxic metals specified in the WIPP RCRA Part B Permit Application. Sampling and analysis procedures for VOCs and toxic metals in TRU sludges are

being developed and, when completed, the requirements will be included in the QAPP. (DOE/WIPP-069 [Rev. 4], Section 3.3.5.3)

Compliance Method:

A. Process Knowledge Plan

The proposed waste streams are BCLA-TRU000001: glove box trash and debris, BCLA-TRU000002: solidified liquids, BCLA-TRU000003: nonregulated (nonhazardous) metal and laboratory equipment, and BCLA-TRU000004: pyrochemical salt blocks from the Isotope Separation and Advanced Manufacturing (ISAM) Process. They have been contaminated primarily with plutonium and its related constituents and are classified as nonmixed transuranic. These waste streams shall be characterized by process knowledge. These wastes cannot be sampled because they are too heterogeneous in composition (Waste Streams 1 and 3) or sampling is an As Low As Reasonably Achievable (ALARA) concern (all waste streams). This is in accordance with Section 4.1.1 of NVO-325 (Rev. 1). These waste streams are described in building-specific Procedures (Facility Safety Procedures).

These waste streams are further evaluated and certified by RCRA-qualified personnel on TRU Waste Parcel Log Cards, as referenced in Procedure TRU-6, as containing no hazardous waste constituents. These Parcel Log Cards will then be reviewed by the Waste Package Certifier. The Parcel Log Cards will contain information that shall be traceable to the waste container. The information shall be documented on the Parcel Log Card at the time of generation. Wastes that are characterized by process knowledge shall be described in the application and supporting documents.

B. Additional WIPP-Required Characterization Methods

VOC and headspace gas sampling will be implemented assuring that each nonmixed TRU waste package will be analyzed for the required constituents.

VOC gas sampling will be implemented in those waste streams that require this form of sampling for shipment in the TRUPACT-II and by the WIPP.

Headspace gas sampling will be implemented to determine statistically if each waste stream generates hydrogen gas in amounts higher than allowed by the TRUPACT-II and WIPP requirements. If it is established through this statistical headspace gas sampling that hydrogen is not a concern, this documentation will be kept on file and the sampling discontinued.

Real-Time Radiography (RTR) may be performed on each nonmixed TRU waste package, and records of those tests will be maintained as required by WIPP.

Currently, the LLNL, like most other TRU waste generation sites, has not developed a site-specific TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) or the required Quality Assurance Project Plan (QAPjP) which is the site lower tier document to the WIPP Quality Assurance Program Plan (QAPP).

Until such time that all research is completed on the WIPP test phase, LLNL will conduct these requirements as stated above based on existing quality assurance procedures and plans being utilized on site for waste characterization programs.

Existing quality assurance procedures and plans will be utilized in the development of the LLNL QAPjP at such time as all of the requirements have been developed based on the test phase at the WIPP. Should the TRUPACT-II be elected as the shipping cask for transport of nonmixed TRU waste to the NTS, all TRUPACT-II requirements will be incorporated into the application and a revision submitted to DOE/NV for approval.

III. WASTE STREAM INFORMATION

Nonmixed Transuranic waste generated by LLNL, proposed to be shipped to the NTS for storage, are from four waste streams. The waste streams are identified as the following:

A.	Glove Box Waste	BCLA-TRU000001
B.	Solidified Liquid Waste	BCLA-TRU000002
C.	Metal Scrap Waste	BCLA-TRU000003
D.	ISAM Program Salt Block Waste	BCLA-TRU000004

NOTE: The most restrictive requirement for each waste form criterion for each waste stream discussed below is listed in **bold face type**.

A. Glove Box Waste

1. Waste Stream Identification Number: BCLA-TRU0000001
2. Waste Type: Nonmixed Transuranic
3. Waste Stream Description: This waste stream consists of trash (sometimes referred to as "glove box" waste) and occasional trash not generated from glove boxes (room waste). This waste stream is the predominant TRU waste produced at LLNL in terms of total volume. This waste stream includes essentially untreated solid materials such as wiping tissues, paper, plastic, chemistry glassware, ceramics, and nonregulated metals, as well as small quantities of solidified liquids or sludges. This waste requires no further treatment or processing when routine bagout and waste packaging procedures are followed.
4. Waste Certification Flow Diagram: See Figure 4
5. Waste Acceptance Criteria:
 - a. General Waste Form Criteria

(1) Transuranics

NTS Requirements:

Requests for interim storage of all TRU waste will be considered on a case-by-case basis.

TRU waste must meet all the NVO-325 (Rev. 1) waste acceptance criteria (WAC) - including DOE/Headquarters (HQ) designation, application to DOE/NV, and participation in the waste generator approval process. TRU waste is only accepted at the NTS for interim storage prior to shipment to the Waste Isolation Pilot Plant. In addition, the generator will be required to provide documentation with their application that the waste is certified to the WIPP WAC, per NVO-325 (Rev. 1), Section 5.5.3.

WIPP Requirements For Contact-Handled Waste:

For purposes of TRU waste certification, the lower limit of >100 nanocuries/gram (nCi/g) of TRU radionuclides in the waste shall be interpreted as >100 nCi per gram of waste matrix. The weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and Ra-226) (DOE/WIPP-069 [Rev. 4], Section 3.3.6.1).

Waste Stream BCLA-TRU0000001: Glove Box Waste

HWM = Hazardous Waste Management
GEN = Generator
LLW = Low-level Waste
TRU = Transuranic
TRUW = Transuranic Waste
WCE = Waste Certification Engineer
WCC = Waste Container Custodian
WCO = Waste Certification Official

Figure 4. Waste Certification Flow Diagram - BCLA-TRU000001

Compliance Method: The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. The determination of nuclide concentrations is performed in accordance with either the Building 251 or the Building 332 Procedures.

(2) Hazardous Waste Components

NTS Requirements:

TRU offered for disposal at NTS waste management sites shall not exhibit any characteristics of, or be listed as, hazardous waste as identified in Title 40 CFR 261, "Identification and Listing of Hazardous Waste" or California Code of Regulation, Title 22, Division 4.5, Chapter 11, Section 66261. (NVO-325 [Rev. 1], Section 5.5.1.1.B)

WIPP Requirements For Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with Transuranics. Waste packages containing hazardous waste shall be identified with the appropriate DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D. (DOE/WIPP-069 [Rev. 4], Section 3.3.5.1)

Aqueous materials which have a pH less than 2.0 or greater than 12.5 are prohibited per 40 CFR 261.22(a)(1). (DOE/WIPP-069 [Rev. 4], Section 3.3.5.2)

Compliance Method: Nonmixed Transuranic wastes for interim storage at NTS will not contain listed hazardous waste or exhibit hazardous waste characteristics as defined in 40 CFR 261 and CCR Title 22, Division 4.5, Chapter 11, Section 66261. The Building 251 and 332 Procedures document administrative and physical controls of materials utilized in each facility to achieve compliance with this requirement. Personnel responsible for identifying, characterizing, and certifying TRU waste shall receive training on the Federal and State of California characteristic and listed hazardous wastes.

(3) Free Liquids

NTS Requirements:

Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions. LLW disposed at the NTS waste

management sites shall contain as little free liquids as is reasonably achievable, but in no case shall the liquid equal or exceed 0.5 percent by volume of the external waste container (NVO-325 [Rev. 1], Section 5.5.1.1.C).

WIPP Requirements For Contact-Handled Waste:

Liquid waste will not be emplaced in the WIPP. TRU waste for emplacement in the WIPP shall contain as little residual liquid as is reasonable achievable. All internal containers (e.g., bottles, cans, etc.) must be well-drained, but may contain residual liquids. As a guideline, residual liquid in well-drained containers will be restricted to approximately one percent of the volume of the internal container. In no case shall the total liquid equal or exceed one volume percent of the waste container (e.g., drum or standard waste box (SWB)). (DOE/WIPP-069 [Rev. 4], Section 3.3.2.1).

Waste for shipment in TRUPACT-II shall contain less than one volume percent of the waste container as liquids. (DOE/WIPP-069 [Rev. 4], Section 3.3.2.2)

Compliance Methods: The WIPP requirement of not more than 1.0% free-liquids by volume shall be met. This waste is not offered for disposal at the NTS, but rather for storage and eventual shipment to the WIPP for disposal. Therefore, the NVO-325 (Rev. 1) requirement for 0.5% free liquid by volume is not applicable to this waste. Verification of free liquid content will be provided through Real-Time Radiography (RTR).

(4) Particulates

NTS Requirements:

Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent of less-than-ten-micrometer-diameter particles, or 15 weight percent of less-than-200-micrometer-diameter particles. Waste that is known to be in a particulate form or in a form that could mechanically or chemically be transformed to a particulate during handling and interim storage shall be immobilized. When immobilization is impractical, other acceptable waste packaging shall be used, such as the following:

- *Overpacking (i.e., 55-gallon drum inside 83- or 85-gallon drum);*
- *steel box with no liner;*
- *wooden box with a minimum of 6-mil sealed plastic liner;*

- *steel drum with a minimum of 6-mil sealed plastic liner (NVO-325 [Rev. 1], Section 5.5.1.1.D).*

WIPP Requirements For Contact-Handled Waste Immobilization:

Powders, ashes, and similar particulate waste materials shall be immobilized if more than one weight percent of the waste matrix in each package is in the form of particles below ten microns in diameter, or if more than 15 weight percent is in the form of particles below 200 microns in diameter. (DOE/WIPP-069 [Rev. 4], Section 3.3.1.1)

Compliance Method: Nonmixed Transuranic waste is evaluated by process knowledge or segregated and evaluated for particulates in accordance with the Building 332/251 procedures. Fine particulates, if present in excess of allowed amounts, will be immobilized as prescribed by the liquid waste solidification procedure and in accordance with the Building 332/251 procedures.

(5) Gases

NTS Requirements:

Transuranic waste gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 1.5 atmospheres at 20°C. Compressed gases as defined by Title 49 CFR 173.300, including unpunctured aerosol cans, will not be accepted for storage or disposal. Aerosol cans will have puncture disfigurements recognizable by Real-Time Radiography (RTR). Expanded gas cylinders must have the valve mechanism removed. (NVO-325 [Rev. 1], Section 5.5.1.1.E)

WIPP Requirements For Contact-Handled Waste Explosives and Compressed Gases:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases (WIPP/DOE-069 (Rev. 4), Section 3.3.4.1)

Waste containers with waste that could potentially generate gases shall be vented. (DOE/WIPP-069 [Rev. 4], Section 3.4.7.1)

Compliance Method: Compressed gas as defined by Title 49 CFR 173.300, including unpunctured aerosol cans, will not be disposed in TRU containers. Compressed gases and intact aerosol cans will be segregated. Nonhazardous aerosol cans will be punctured and

placed into TRU waste containers in accordance with the Building 332/251 procedures.

LLNL will utilize the WIPP-required carbon composite filters on all nonmixed TRU waste packages.

Headspace gas sampling will be performed to statistically assure hydrogen gas does not exceed required limits.

(6) Stabilization

NTS Requirements:

Where practical, waste shall be treated to reduce volume, promote waste minimization and provide a more structurally and chemically stable waste form. (NVO-325 [Rev. 1], Section 5.5.1.1.F)

WIPP Requirements - None

Compliance Method: Nonmixed Transuranic waste from Buildings 332 and 251 consists primarily of solid materials contaminated with radionuclides and is an inherently stable waste form. Procedures governing stabilization and control measures are performed in accordance with NVO-325 (Rev. 1) as defined in the Building 332/251 procedure.

(7) Etiologic Agents

NTS Requirements:

Transuranic waste containing pathogens, infectious wastes, or other etiologic agents as defined in Title 49 CFR 173.386 will not be accepted for disposal at NTS. (NVO-325 [Rev. 1], Section 5.5.1.1.G)

WIPP Requirements - None

Compliance Method: By process knowledge and administrative controls, etiologic agents are not allowed into Buildings 332 and 251; therefore, there is no potential that etiologic waste could be placed into the TRU waste containers. Control measures are defined in the Building 332/251 procedures.

(8) Chelating Agents

NTS Requirements:

Transuranic waste containing chelating or complexing agents at concentrations greater than one percent by weight of the

waste form will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.H)

WIPP Requirements - None

Compliance Method: As determined by process knowledge and administrative controls, chelating and complexing agents in concentrations greater than one percent by weight are not present in Building 332/251. If chelating agents are suspected to be present, TRU waste will be segregated for further analysis. Control measures are defined in the Building 332/251 procedures.

(9) Polychlorinated Biphenyls (PCBs)

NTS Requirements:

PCB-contaminated TRU waste will not be accepted for disposal at the NTS unless the PCB concentration meets municipal solid waste disposal levels of 50 ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325 [Rev. 1], Section 5.5.1.1.I)

WIPP Requirements - None

Compliance Method: Inventory controls shall be used to assure that PCBs are at levels that may be managed as municipal solid waste by both State of California and Federal standards (5 ppm and 50 ppm, respectively).

(10) Explosives and Pyrophorics

NTS Requirements:

Transuranic waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust if the container is breached, will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.J)

WIPP Requirements For Explosives and Compressed Gases in Contact-Handled Waste:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases. (DOE/WIPP-069 [Rev. 4], Section 3.3.4.1)

WIPP Requirement For Pyrophoric Materials in Contact-Handled Wastes:

Pyrophoric materials, other than radionuclides, shall be rendered safe by mixing them with chemically stable materials (e.g., concrete, glass) or shall be processed to remove their hazardous properties. Not more than one percent by weight of the waste in each waste container may be pyrophoric forms of radionuclides, and these shall be generally dispersed in the waste. (DOE/WIPP-069 [Rev. 4], Section 3.3.3.1)

Compliance Method: Plutonium fines are diffused throughout the waste matrix. Nonradioactive fines are solidified if pyrophoric. Nonmixed TRU waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust will not be shipped to the NTS for storage.

b. General Regulatory Waste Package Criteria

(1) Design

NTS Requirements:

Type A packaging shall be designed to meet Title 49 CFR 173.411, "General Design Requirements," and Title 49 CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOE Type A Package Certification Program (see MLM-3245, "DOT 7A Type A Certification Document," or succeeding DOE publication). Type B packaging must meet the applicable requirements of Title 10 CFR 71. Strong, tight packaging used for shipping limited quantities and low specific activity TRU waste excepted by Titles 49 CFR 173.421 and 173.425, respectively, must be constructed so that it will not leak during normal transportation and handling conditions. (NVO-325 [Rev. 1], Section 5.5.1.2.A)

WIPP Requirements For Waste Containers in Contact-Handled Waste:

Waste containers for emplacement in the WIPP shall be noncombustible and meet all applicable requirements of 49 CFR 173.412 for Type A packaging. Waste containers of various sizes, shown to meet Department of Transportation (DOT) Type A requirements by methods detailed in MLM-3245 shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/ WIPP-069 (Rev. 4), Section 3.2.1.1)

Standard 55-gallon (208-liter) metal drums, SWBs, 55-gallon drums overpacked in a SWB, and an experimental bin overpacked in a SWB are authorized for shipment of contact-handled TRU (CH-TRU) waste in TRUPACT-II. (DOE/WIPP-069 [Rev. 4], Section 3.2.1.2)

Compliance Method: LLNL Type A containers shall be designed to comply with 49 CFR 173.411, "General Design Requirements," 49 CFR 173.412, "Additional Design Requirements for Type A packages," and 49 CFR 173.474, "Quality Control for Construction of Packaging." All LLNL TRU waste containers will meet the WIPP/WAC and NVO-325 requirements. All waste packages will be acceptable for transport in TRUPACT-II or other WIPP approved transportation method.

(2) Nuclear Safety

NTS Requirements:

The quantity of fissile radioactive materials shall be limited so that an infinite array of such packages will remain subcritical. This quantity shall be determined on the basis of a specific nuclear safety analysis, considering credible accident situations, and taking into account the actual materials in the waste. See Title 49 CFR 173.451, "Fissile Materials - General Requirements." (NVO-325 [Rev. 1], Section 5.5.1.2.B)

WIPP Requirements For Nuclear Criticality in Contact-Handled Waste:

The fissile or fissionable radionuclide content of CH-TRU waste packages shall be no greater than the following values, in Pu-239 fissile-gram equivalent (FGE): 200 grams per 55-gallon drum (1.21 m³) less than 325 grams for a standard waste box.

The Pu-239 FGE shall be calculated using the methods detailed in Appendix 1.3.7 of the TRUPACT-II Safety Analysis Report For Packaging (SARP). (DOE/WIPP-069 [Rev. 4], Section 3.4.2.1)

TRUPACT-II Requirements for Packaging:

The fissile or fissionable radionuclide content of CH-TRU waste in the TRUPACT-II, including two times the measurement error, shall be less than 200 grams for a 55-gallon drum or less than 325 grams for a SWB. The sum of the fissile equivalents of all waste packages in the entire payload quantity (including two times the error) may not exceed 325 grams. See the calculational methods detailed in Appendix

1.3.7 of the TRUPACT-II SARP for details. (DOE/WIPP-069 [Rev. 4], Section 3.4.2.2)

Compliance Method: Levels of TRU nuclides associated with this waste stream are such that the waste is not considered fissile material. In any event, the material shall be limited so that an infinite array of such packages will remain subcritical. The waste meets the requirements of Title 49 CFR 173.451, "Fissile Material - General Requirements." Control measures are defined in Building 612 Facility Safety Procedure.

The Pu-239 FGE will be calculated as required in Appendix 1.3.7 of the TRUPACT-II SARP.

(3) Nuclear Heating

NTS Requirements:

The quantity of radioactive materials shall be limited for each waste matrix and package type so that the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity. See Title 49 CFR 173.442, "Thermal Limitations," for temperature limits. (NVO-325 [Rev. 1], Section 5.5.1.2.C)

WIPP Requirements For Thermal Heating in Contact-Handled Waste:

Individual CH-TRU waste packages in which the average thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) shall have the thermal power recorded in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.6.1)

Compliance Method: Levels of radionuclides associated with this waste stream are limited; therefore, the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or the integrity of the package.

Individual CH-TRU waste packages in which the thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) will have the thermal power recorded on the data package.

LLNL calculates the thermal power of each waste package and compares it to the allowed values for the package's TRUCON shipping category. If the allowed value is exceeded, the package will not be certified for shipment in TRUPACT-II.

(4) Radiation Levels

NTS Requirement:

The external radiation levels for packages shall not exceed 200 mrem/hr on contact during handling, shipment, and disposal unless specifically excepted by DOT regulations. See Title 49 CFR 173.441, "Radiation Level Limitations." Type B containers that will be unloaded by remote procedures will be addressed on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.2.D)

WIPP Requirement for Surface Dose Rate and TRUPACT-II Requirements:

Waste Packages shall have a maximum surface dose rate at any point no greater than 200 mrem/hr. Neutron contributions of greater than 20 mrem/hr. to the total waste package dose rate shall be reported separately in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.1.

The external dose rates on the loaded TRUPACT-II placed on the trailer are limited to 200 mrem/hr at the surface of the TRUPACT-II and 10 mrem/hr at two meters. Dose rates on the TRUPACT-II must comply with 10 CFR 71.47. Drums or SWBs shall not exceed the 200 mrem/hr surface reading or 10 mrem/hr at two meters. Shielded waste containers are allowed for As Low As Reasonably Achievable (ALARA) purposes only and must comply with Section 12.0 of Appendix 1.3.7 of the TRUPACT-II SARP. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.2)

Compliance Method: Packages will be surveyed externally for radiation levels in accordance with 49 CFR 173.441. External radiation levels for containers shall not exceed 200 mrem/hr on contact and 10 mrem/hr at two meters. Neutron contributions of greater than 20 mrem/hr to the total waste package dose rate will be recorded separately in data package. Drums or SWBs will not exceed the 200 mrem/hr surface reading. Surface readings will comply with 10 CFR 71.47. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(5) External Contamination

NTS Requirements:

Packages shall be within DOT contamination limits upon receipt at the NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325 [Rev. 1], Section 5.5.1.2.E)

WIPP Requirement for Removable Surface Contamination in Contact-Handled Waste:

Removable surface contamination on waste packages or package assemblies to be emplaced in WIPP shall not be greater than 50 picocuries per 100 cm² for alpha-emitting radionuclides and 450 picocuries per 100 cm² for beta-gamma-emitting radionuclides. Fixation of surface contamination to meet the above criterion is not permitted. (DOE/WIPP-069 [Rev. 4], Section 3.4.5)

Compliance Method: Packages will be surveyed for nonfixed (removable) radioactive contamination on each waste container surface to ensure levels are in accordance with 49 CFR 173.443 and the WIPP/WAC requirements. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(6) Activity Limits

NTS Requirements:

The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type A and Type B Packages," shall be met. Where applicable, the activity limits of Titles 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low Specific Activity Radioactive Materials," shall be met for strong, tight packages. See NVO-325 (Rev. 1), Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325 [Rev. 1], Section 5.5.1.2.F)

WIPP Requirements For Specific Activity and Pu-239 Equivalent Activity in Contact-Handled Waste:

For the purpose of TRU waste certification, the lower limit of greater than 100 nCi/g of TRU radionuclides in the waste shall be interpreted as greater than 100 nCi/g of waste matrix. The weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and Ra-226). Documented evidence shall exist to show that the specific activity of any TRU waste package is greater than 100 nCi/g of waste and that the activity of RH-TRU waste does not exceed 23 Ci/liter. (DOE/WIPP-069 [Rev. 4], Section 3.3.6)

Waste packages shall not exceed 1000 Ci of Pu-239 equivalent activity (PE-Ci). Documented analyses shall be available to show that each package meets the limit. (DOE/WIPP-069 [Rev. 4], Section 3.4.3)

Compliance Method: The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type B Packages," shall be met, when applicable. The activity limits for Title 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low-Specific Activity Radioactive Materials," are not applicable. Waste shall meet the requirements of Title 10 CFR 61. The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. LLNL calculates Pu-239 equivalent curies for each waste package and certifies that it does not exceed 1000 PE-Ci. The determination of nuclide concentrations is performed in accordance with the Building 251 and 332 Procedures and DOE/WIPP-069 [Rev. 4], Section 3.4.3. Remote handled waste will not be sent to the NTS for interim storage. Activities of the waste will be such that shielding within the waste packages will not be required and all external dose rates will be within the DOT requirements for Type A packaging.

(7) Multiple Hazards

NTS Requirements:

Waste containing multiple hazards shall be packaged according to the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." Currently, the NTS does not accept mixed waste for storage or disposal. (NVO-325 [Rev. 1], Section 5.5.1.2.G)

WIPP Requirements For TRU Mixed Wastes in Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with transuranics. Waste packages containing hazardous waste shall be identified with the appropriate DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D. The basis for the identification of the hazardous wastes will be process knowledge supplemented with sampling. (DOE/WIPP-069 [Rev. 4], Section 3.3.5)

Compliance Method: Materials associated with this waste stream are characterized to assure that no multiple hazards exist as described in building-specific procedures. No TRU waste containing hazardous constituents will be sent to the NTS for storage.

c. NTS Specific Package Criteria

(1) Closure

NTS Requirements:

The package closure shall be sturdy enough that it will not be breached under normal handling conditions and will not serve as a weak point for package failure. (NVO-325 [Rev. 1], Section 5.5.1.3.A)

WIPP Requirement For Waste Containers in Contact-Handled Waste:

Waste containers shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/WIPP-069 [Rev. 4], Section 3.2.1)

Compliance Method: Each package shall be closed and sealed to prevent leakage during normal handling. Closure will not serve as a weak point for package failure. All waste containers will be handled and stored in a manner that will not compromise its Type A packaging. Building 332/251 procedure, HWM Procedure 203.

(2) Strength

NTS Requirements:

Except for bulk waste, waste packaged in steel drums, or SEALAND® containers, the waste package (packaging and contents) shall be capable of supporting a uniformly distributed load of 19,528 kg/m² (4,000 lb/ft²). This is required to support other waste packages and earth cover without crushing during stacking and covering operations. (NVO-325 [Rev. 1], Section 5.5.1.3.B)

WIPP Requirement - see Closure, above.

Compliance Method: Bulk (nonmixed) TRU waste will not be sent to the NTS for storage. SEALAND® containers will not be used for packaging TRU waste. All nonmixed TRU waste will be packaged in WIPP-acceptable packaging, namely, steel drums or steel TRUPACT-II Standard Waste Boxes or Ten Drum Overpacks. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications.

(3) Handling

NTS Requirements:

All waste packages shall be provided with permanently attached skids, cleats, offsets, rings, handles, or other auxiliary lifting devices to allow handling by means of forklifts, cranes, or similar handling equipment. Lifting rings and other auxiliary lifting devices on the package are permissible, provided they are recessed, offset, or hinged in a manner that does not inhibit stacking the packages. The lifting devices must be designed to a 5:1 safety factor based on the ultimate strength of the material. All rigging devices that are not permanently attached to the waste package must have a current load test based on 125 percent of the safe working load. (NVO-325 [Rev. 1], Section 5.5.1.3.C)

WIPP Requirements:

All waste packages shall be provided with cleats, offsets, chimes (SIC), skids or 7-pack handling fixture for handling by means of fork trucks, cranes, or similar handling devices. Lifting rings and other auxiliary lifting devices on the waste packages, if provided, shall be recessed, offset, or hinged in a manner which does not inhibit stacking the waste packages. (DOE/WIPP-069 [Rev. 4], Section 3.2.3.1)

Compliance Method: Waste packages shall be provided with permanently attached skids, cleats, offsets, chimes, rings, handles, or other auxiliary lifting devices to allow handling by means of a forklift, crane, or similar handling equipment. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications. The LLNL TRU Waste Program Certification and QA Plan specifies certification program responsibilities for TRU waste package specifications.

(4) Size

NTS Requirements:

1.2- x 1.2- x 2.1-m (4- x 4- x 7-ft) or 1.2- x 0.6- x 2.1-m (4- x 2- x 7-ft) (width, height, length) boxes or 208-liter (55-gallon) drums are required to be used. Bulk waste container approval is discussed in NVO-325 (Rev. 1), Section 5.5.4. While these sizes allow optimum stacking efficiency in disposal cells, other dimensions are acceptable with approval from DOE/NV on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.3.D)

WIPP Requirements:

Contact-handled TRU waste packages or package assemblies shall not exceed 12- x 8- x 8.5-feet (3.7- x 2.4- x 2.6-m) in overall length x width x height dimensions. (DOE/WIPP-069 [Rev. 4], Section 3.2.2.1)

Compliance Method: Only WIPP-approved, TRUPACT-II acceptable packaging will be shipped to the NTS. Container specifications are maintained by the LLNL Supply and Distribution Department (TRU Waste Program Certification and QA Plan).

(5) **Weight**

NTS Requirements:

In addition to the weight limits set for specific packaging designs, NTS imposes limits of 4,082 kg (9,000 pounds) per box and 544 kg (1,200 pounds) per 208-liter (55-gallon) drum. Packages exceeding 4,082 kg (9,000 pounds) require crane or large forklift removal and must be approved by the REEC Co Waste Operations Department prior to shipment. Shipments of this type must be in a removable-top or removable-side trailer. (NVO-325 [Rev. 1], Section 5.5.1.3.E)

WIPP Requirements:

The following weight limits shall apply for waste package assemblies transported in the TRUPACT-II package:

- **1,000 lbs per drum**
- **1,450 lbs per drum overpacked in a SWB**
- **4,000 lbs per SWB**
- **7,265 lbs per TRUPACT-II payload**
- **19,250 lbs per TRUPACT-II payload, including the weight of the TRUPACT-II.**

Recent enhancements in the TRUPACT-II design have resulted in an average payload weight of approximately 6,200 lbs. The total weight of the top seven-pack of drums or SWB including error shall be less than or equal to the total weight including error of the lower seven-pack of drums or SWB. The DOT limit of 80,000 lbs gross vehicle weight (GVW) must also be met.

Compliance Method: Waste packages are weighed per HWM Procedure 203 to assure gross weight does not exceed permissible NTS, WIPP, or TRUPACT-II weight limits.

(6) Loading

NTS Requirements:

Waste packages shall be loaded to ensure that the interior volume is as efficiently and compactly loaded as practical. High-density loading will allow efficient RWMS space utilization and provide a more stable waste form that will reduce subsidence and enhance the long-term performance of the disposal site. (NVO-325 [Rev. 1], Section 5.5.1.3.F)

WIPP Requirements - None

Compliance Method: This requirement is not applicable as nonmixed TRU waste will not be offered for disposal at the NTS. Waste packages shall be loaded as efficiently and completely as possible. HWM Procedure 204 is currently utilized for the loading of the Polypanther Type B shipping cask. This procedure will be revised if loading operations switch to the use of the TRUPACT-II or other Type B shipping casks.

(7) Nonstandard Type A Packaging

NTS Requirements:

Use of DOT Type A packages not previously evaluated under the DOE Type A Package Certification Program (see MLM-3245, etc.) will not be permitted. (NVO-325 [Rev. 1], Section 5.5.1.3.G)

WIPP Requirements - None

Compliance Method: Nonstandard Type A Packaging will not be used for TRU waste disposal. Packaging shall meet NTS and WIPP criteria. Refer to LLNL Hazardous Materials Transportation Safety Manual.

(8) Package Protection

NTS Requirements:

The generator shall take the following precautions to protect the waste package after closure.

- (a) ***The preshipment storage environment shall be controlled to avoid adverse influence from weather or other factors***

on the containment capability of the waste packaging during handling, storage, and transport. The generator preparing waste for preshipment storage shall take all reasonable precautions to preclude the accumulation of moisture on or in packages prior to their arrival at the NTS.

- (b) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.**
- (c) Each waste package shall be prepared for shipment so as to minimize damage during transit. Minor damage incurred during transit, not attributable to poor packaging, will be repaired at the NTS without charge to the waste generator. Costs for repairs of damage caused by waste generator or carrier negligence, as well as any necessary decontamination to meet DOE Order 5480.11, will be charged to the waste generator. (NVO-325 [Rev. 1], Section 5.5.1.3.H)**

WIPP Requirements - None

Compliance Method: LLNL will prepare its waste shipments to minimize damage during shipment and storage. TIDs will be placed on each container upon completion of certification. TRU Waste Program Certification and QA Plan and Procedures Building 332 FSP, Appendix H, MM-VI-3, and HWM 204.

(9) Marking and Labeling

NTS Requirements:

Each waste package shall have the following information:

- (a) Marking and labeling as required in Title 49 CFR 172, Subparts D and E.**
- (b) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (See Figure 8, page 76 of the NVO-325 (Rev. 1)). If the waste is unpackaged bulk, a signed NV-211 label must accompany the shipment papers. These labels can be obtained from REECo.**
- (c) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REECo (see Appendix D in the NVO-325 (Rev. 1)); one alpha-character for type of waste - M for MW, T for TRU, or X for TRUMW; two numeric characters for current fiscal year; three numeric characters for shipment**

sequence. Example MDL90001 would mean a shipment from EG&G Mound of low-level waste in fiscal year 1990 and the first shipment.

- (d) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.**
- (e) Approved 13-digit waste stream identification number (see Section 5.1 in NVO-325 [Rev. 1]).**
- (f) Package weight in units of pounds and kilograms. (NVO-325 [Rev. 1], Section 5.5.1.3.1)**

WIPP Requirements:

- (g) In addition to DOT labeling requirements, each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.**
- (h) The identification marking must be reasonably expected to remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground. (DOE/WIPP-069 [Rev. 4], Section 3.4.8.1)**
- (i) The shipper shall assign a unique shipment number to each shipment. The shipment number consists of the two-letter shipping site identification code specified in Table B-3, followed by the last two digits of the year of transport to the WIPP, and the next consecutive four digit shipment number for the site. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.3)**
- (j) When the interim storage site (rather than the generating site) packages drums into a package assembly, the interim storage site assigns the package assembly number. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.7)**

Compliance Method:

- (a) All waste packages will be marked and labeled in accordance with 49 CFR 172, Subparts D and E. Procedures HWM 203 and 204.**
- (b) An NV-211, "Packaging Certification" label will be completed and signed by the Waste Certification Official or Waste**

Certification Engineer and affixed to each container. HWM Procedure 204.

- (c) The shipment number shall consist of eight characters. The first two characters will be "L" and "L" (assigned by REEC_o); the third character will be "T" for transuranic waste; the fourth and fifth characters will represent the fiscal year (i.e., 93); and the last three characters will be the shipment number, consecutively numbered from the first shipment by LLNL to the NTS each fiscal year. Example: LLT93001. HWM Procedure 204.
- (d) LLNL will supply a unique six-character number for each package within a shipment.
- (e) The waste stream identification number shall be 13 characters in length. The first four characters will be the DOE-assigned Waste Management Information System (WMIS) generator code and the remaining nine characters are the generator-assigned waste stream code. Example: BCLA-TRU000001.
- (f) The package weight will be marked on the container in both pounds and kilograms in characters at least one-half inch in height. HWM Procedure 203.
- (g) Each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be at least medium density Code 39 barcode symbology in characters at least one inch high, and alphanumeric characters at least one-half inch high.
- (h) The identification marking will remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground.
- (i) This requirement is not applicable as NTS is the interim storage site and is required to be the shipper to the WIPP disposal site.
- (j) NTS, as the interim storage site (rather than the generating site), will package the drums into a package assembly, the interim storage site assigns the package assembly number.

(10) Barcoding

NTS Requirements:

The shipment, package, and waste stream identification numbers shall be barcoded according to the following standards:

- (a) Code 39.**
- (b) Medium to high density, high density preferred.**
- (c) 1.0" high barcode.**
- (d) Human readable interpretation (HRI) 0.50" high printed below the barcode.**
- (e) Spacing between barcode and HRI will be 0.10".**
- (f) Minimum left and right margin (quiet zones) will be at least 0.25".**
- (g) All barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number, and waste stream identification number.**
- (h) A total of two barcode labels shall be placed on each box or nonstandard package near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top.**
- (i) A sample barcode must be submitted to REECo/WMD prior to the first shipment to ensure that REECo/WMD equipment can be used to read the barcode. (NVO-325 [Rev. 1], Section 5.5.1.3.J)**

WIPP Requirements:

The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.

Compliance Method: LLNL barcoding will comply with DOE/NV requirements and meet the following requirements:

- (a) Code 39.**
- (b) Medium density.**

- (c) Barcode will be 1.0" high.
 - (d) Human readable interpretation 0.50" high will be printed below the barcode.
 - (e) Spacing between barcodes and HRI will be 0.10".
 - (f) Left and right margins will be at least 0.25".
 - (g) Barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number; and waste stream identification number.
 - (h) A total of two barcode labels shall be placed on each TRUPACT-II Standard Waste Box near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top. Each box and drum will also have LLNL's WIPP-required barcode labels. These are of the form "LL85n nnnnnTRU, where each n is a single-digit number. For each drum, one of these TRU barcode labels will be placed on the top of the drum lid and three on the side near the bottom. For each box, one TRU barcode label will be placed on the top and one on each of the four sides. Procedures for applying TRU barcodes are found in HWM 202. Procedures for applying the NTS-required barcode labels will be documented in a revision of HWM Procedure 204.
 - (i) A sample barcode will be submitted to REEC Co prior to the first shipment.
- (11) Onsite Transfer

NTS Requirements:

Onsite transfer must be in accordance with NV 54XG.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpackaged bulk material having external contamination, that contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325 [Rev. 1], Section 5.5.1.3.K)

WIPP Requirements - None

Compliance Method: Not applicable.

d. Additional Criteria For Mixed Waste

NTS Requirements:

In addition to meeting all of the TRU WAC, mixed waste offered for disposal at the Area 5 RWMS Mixed Waste Management Unit (MWMU) must meet the criteria described in NVO-325 (Rev. 1), Section 5.5.2.

Compliance Method: Not applicable as mixed TRU waste will not be sent to the NTS.

e. Additional Criteria For Transuranic/Transuranic Mixed Waste

NTS Requirements:

Requests for storage of all TRU waste will be considered on a case-by-case basis only. (NVO-325 [Rev. 1], Section 5.5.3)

Compliance Method: LLNL is requesting to ship nonmixed TRU waste to the NTS for interim storage until such time that it can be disposed at the WIPP facility.

f. Additional Criteria For Bulk Waste

NTS Requirements:

Bulk waste is waste which is disposed of in Area 3. It generally exists in a form not suited to the conventional packaging requirements of Area 5. In addition to meeting the TRU WAC, bulk TRU waste must meet the requirements of Title 49 CFR 173.425(c). Nevada Test Site-generated bulk waste must be transported in accordance with NV 54XG.1A and applicable DOT requirements. Bulk containers must be approved by DOE/NV. (NVO-325 [Rev. 1], Section 5.5.4)

Compliance Method: Not applicable as bulk nonmixed TRU waste will not be shipped to the NTS.

g. Additional Criteria for Case-by-Case Waste

NTS Requirements:

In addition to meeting LLW WAC, the following case-by-case waste types offered for disposal at the NTS must meet the criteria described below. (NVO-325 [Rev. 1], Section 5.5.5)

WIPP Requirements - None

- (1) **Weight:** (NVO-325 [Rev. 1], Section 5.5.5.1) - See Section III.A.5.c(5), "Weight."
- (2) **Activity Limits:** (NVO-325 [Rev. 1], Section 5.5.5.2) - See Section III.A.5.b(6), "Activity Limits."
- (3) **Radioactively Contaminated Asbestos:** (NVO-325 [Rev. 1], Section 5.5.5.3)

Compliance Method: Nonmixed TRU waste containing regulated asbestos will not be shipped to the NTS.

- (4) **DOE Comparable Greater than Class C:** (NVO-325 [Rev. 1], Section 5.5.5.4)

Compliance Method: LLNL nonmixed TRU waste may be greater than Class C. LLNL nonmixed TRU waste is not being offered for disposal, but rather for interim storage.

- (5) **Classified Waste Streams:** (NVO-325 [Rev. 1], Section 5.5.5.5) - Not applicable.
- (6) **Radioactive Animal Carcasses:** (NVO-325 [Rev. 1], Section 5.5.5.6) - Not applicable.
- (7) **Other Waste Forms:** (NVO-325 [Rev. 1], Section 5.5.5.7) - Not applicable.

h. Additional TRU Requirements for WIPP:

- (1) **New Mexico Environmental Department Requirements:**

The NMED has the authority to promulgate additional requirements for the management of TRU mixed waste and to issue site-specific permit conditions during the RCRA permitting process. The NMED has not yet stipulated additional requirements for the mixed waste program. Future requirements, as applicable to the WIPP WAC, will be incorporated into this document as they become known. (DOE/WIPP-069 [Rev. 4], Section 3.6.1.3)

Compliance Method: Not applicable as LLNL will not ship TRU mixed waste to the NTS for interim storage at this time.

6. Waste Stream Characterization Data Sheet: (NVO-325 [Rev. 1], Section 5.6)

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: BCLA-TRU0000001
2. Waste Description: This waste stream consists of glove box waste associated with operations at location Buildings 332 and 251, such as wiping tissues, paper, plastic, chemistry glassware, ceramics, nonregulated metals, and small quantities of solidified liquids or sludges.
 - a. Physical Characteristics: Waste stream is solid.
 - b. Special Handling/Disposal Requirements: None required.
3. Basis for Characterization:
 - a. Process Knowledge: X
 - b. Analytical Knowledge:
 - c. Both:

(If B or C, provide Standardized Data Reporting Forms as necessary.)
4. Radioactive Characteristics:
 - a. Is Waste > NRC Class C (See Title 10 CFR 61.55)? Yes
 - b. WMIS Nuclide Category (circle) ① 2 3 4 5 NA 7 8
(Choose the highest predominant nuclide. The number 6 is not an option.)
 - c. Radioactive Constituents:

Specific Activity Range of Waste Streams

	Nuclide	Chemical Forms	Minimum	Mean	Maximum	Units
1	Am-241	metal oxide	0.	3.46E-03	3.32E-01	Ci/kg
2	Am-242m	metal oxide	0.	6.84E-06	2.29E-02	Ci/kg
3	Am-243	metal oxide	0.	6.87E-07	1.02E-03	Ci/kg
4	Cf-249	metal oxide	0.	7.23E-09	1.59E-05	Ci/kg
5	Cm-244	metal oxide	0.	2.53E-03	2.73E+00	Ci/kg
6	Cm-246	metal oxide	0.	1.80E-08	8.55E-06	Ci/kg
7	Cs-137	metal oxide	0.	6.63E-11	1.58E-08	Ci/kg
8	Eu-152	metal oxide	0.	4.66E-11	1.11E-08	Ci/kg
9	Eu-154	metal oxide	0.	1.76E-11	4.19E-09	Ci/kg
10	Np-237	metal oxide	0.	8.59E-09	1.39E-05	Ci/kg
11	Pu-238	metal oxide	0.	1.84E-03	3.83E-01	Ci/kg
12	Pu-239	metal oxide	0.	3.98E-03	7.19E-02	Ci/kg
13	Pu-240	metal oxide	0.	1.68E-03	3.80E-02	Ci/kg
14	Pu-241	metal oxide	0.	5.16E-02	1.16E+00	Ci/kg
15	Pu-242	metal oxide	0.	5.43E-07	2.60E-05	Ci/kg
16	Sb-125	metal oxide	0.	5.29E-12	1.26E-09	Ci/kg
17	Th-228	metal oxide	0.	1.06E-12	2.53E-10	Ci/kg
18	U-235	metal oxide	0.	7.23E-11	7.11E-08	Ci/kg
19	U-238	metal oxide	0.	9.85E-09	5.03E-06	Ci/kg

Figure 5. Waste Stream Characterization Data Sheet - BCLA-TRU0000001 - Page 1

WASTE STREAM CHARACTERIZATION DATA SHEET (continued)

5. Hazardous Components (for mixed waste): Not Applicable
- a. Basis for Identifying as mixed waste: Not Applicable
 - b. List the applicable EPA waste code, the chemical name, the treatment performed (if applicable) and the regulatory/treatment standard. Attach Standardized Data Reporting Forms. Not Applicable

7. Waste Forecasting: (Three-Year Waste Shipment Forecast) (NVO-325
[Rev. 1], Section 5.7)

THREE-YEAR WASTE SHIPMENT FORECAST							
GENERATOR: LLNL		PREPARED BY: KEM HAINEBACH DATE: 11/30/93					
FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME (m ³)
			TYPE	SIZE	NO. OF CONTAINERS		
FY 1994 10/1 - 12/31					0	0	
1/1 - 3/31					0	0	
4/1 - 6/30					0	0	
7/1 - 9/30					0	0	
FY 1995	BCLA-TRU0000001	TRU	METAL DRUM	55 GALLON	125	1	26
FY 1996	BCLA-TRU0000001	TRU	METAL DRUM	55 GALLON	125	1	26

REMARKS NEXT UPDATES DUE 2/15/94 AND 8/15/94

Figure 6. Three-Year Waste Shipment Forecast - BCLA TRU0000001

8. Packaging and Shipping Information:

Include the DOT proper shipping name, hazard class, and hazard identification number. (NVO-325 [Rev. 1], Section 5.8)

Compliance Method: TRU shipments will be classed as follows (HWM Procedure 204):

- Department of Transportation Shipping Name - Radioactive Material N.O.S.
- Hazard Class - Radioactive Material
- Hazard Identification Number UN 2982

9. Waste Security Information:

Provide information regarding any special security requirements. (NVO-325 [Rev. 1], Section 5.9)

Compliance Method: No security requirements are necessary for Waste Stream BCLA-TRU000001.

B. Solidified Liquid Waste

1. Waste Stream Identification Number: BCLA-TRU0000002
2. Waste Type: Nonmixed Transuranic
3. Waste Stream Description: This waste stream consists of solidified liquids from Buildings 332 and 251. The resulting solidified waste is then packaged in 55-gallon TRU waste drums.

The fluid matrix in its initial (liquid) stage is variable. Liquids may be processed within Building 332 to recover excess plutonium, or are solidified in 2 1/2- to 5-gallon PVC jugs within the glove box.

Water-based liquids are solidified using Aquaset. All newly generated TRU waste in this waste stream will be solidified with Aquaset.

This waste stream contains no powder, ashes, compressed gases, or burnable organics. Individual blocks or tubes of solidified waste are checked to ensure no free liquid remains in the waste.

4. Waste Certification Flow Diagram: See Figure 7
5. Waste Acceptance Criteria:
 - a. General Waste Form Criteria

- (1) Transuranics

NTS Requirements:

Requests for interim storage of all TRU waste will be considered on a case-by-case basis.

TRU waste must meet all the NVO-325 (Rev. 1) WAC - including DOE/HQ designation, application to DOE/NV, and participation in the waste generator approval process. TRU waste is only accepted at the NTS for interim storage prior to shipment to the Waste Isolation Pilot Plant. In addition, the generator will be required to provide documentation with their application that the waste is certified to the WIPP WAC, per NVO-325 (Rev. 1), Section 5.5.3.

(10) Explosives and Pyrophorics

NTS Requirements:

Transuranic waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust if the container is breached, will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.J)

WIPP Requirements For Explosives and Compressed Gases in Contact-Handled Waste:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases. (DOE/WIPP-069 [Rev. 4], Section 3.3.4.1)

WIPP Requirement For Pyrophoric Materials in Contact-Handled Wastes:

Pyrophoric materials, other than radionuclides, shall be rendered safe by mixing them with chemically stable materials (e.g., concrete, glass) or shall be processed to remove their hazardous properties. Not more than one percent by weight of the waste in each waste container may be pyrophoric forms of radionuclides, and these shall be generally dispersed in the waste. (DOE/WIPP-069 [Rev. 4], Section 3.3.3.1)

Compliance Method: Plutonium fines are diffused throughout the waste matrix. This is a solidified aqueous waste stream and contains no pyrophoric or explosive components. Nonmixed TRU waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust will not be shipped to the NTS for storage.

b. General Regulatory Waste Package Criteria

(1) Design

NTS Requirements:

Type A packaging shall be designed to meet Title 49 CFR 173.411, "General Design Requirements," and Title 49 CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOE Type A Package Certification Program (see MLM-3245, "DOT 7A Type A Certification Document," or succeeding DOE publication). Type B packaging must meet the applicable requirements of Title 10 CFR 71. Strong, tight packaging used for shipping limited quantities and low specific activity TRU

waste excepted by Titles 49 CFR 173.421 and 173.425, respectively, must be constructed so that it will not leak during normal transportation and handling conditions. (NVO-325 [Rev. 1], Section 5.5.1.2.A)

WIPP Requirements For Waste Containers in Contact-Handled Waste:

Waste containers for emplacement in the WIPP shall be noncombustible and meet all applicable requirements of 49 CFR 173.412 for Type A packaging. Waste containers of various sizes, shown to meet Department of Transportation (DOT) Type A requirements by methods detailed in MLM-3245 shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/ WIPP-069 (Rev. 4), Section 3.2.1.1)

Standard 55-gallon (208-liter) metal drums, SWBs, 55-gallon drums overpacked in a SWB, and an experimental bin overpacked in a SWB are authorized for shipment of contact-handled TRU (CH-TRU) waste in TRUPACT-II. (DOE/WIPP-069 [Rev. 4], Section 3.2.1.2)

Compliance Method: LLNL Type A containers shall be designed to comply with 49 CFR 173.411, "General Design Requirements," 49 CFR 173.412, "Additional Design Requirements for Type A packages," and 49 CFR 173.474, "Quality Control for Construction of Packaging." All LLNL TRU waste containers will meet the WIPP/WAC and NVO-325 requirements. All waste packages will be acceptable in TRUPACT-II or other WIPP approved transportation method.

(2) Nuclear Safety

NTS Requirements:

The quantity of fissile radioactive materials shall be limited so that an infinite array of such packages will remain subcritical. This quantity shall be determined on the basis of a specific nuclear safety analysis, considering credible accident situations, and taking into account the actual materials in the waste. See Title 49 CFR 173.451, "Fissile Materials - General Requirements." (NVO-325 [Rev. 1], Section 5.5.1.2.B)

WIPP Requirements For Nuclear Criticality in Contact-Handled Waste:

The fissile or fissionable radionuclide content of CH-TRU waste packages shall be no greater than the following values,

in Pu-239 fissile-gram equivalent (FGE): 200 grams per 55-gallon drum (1.21 m³); less than 325 grams for a standard waste box.

The Pu-239 FGE shall be calculated using the methods detailed in Appendix 1.3.7 of the TRUPACT-II Safety Analysis Report For Packaging (SARP). (DOE/WIPP-069 [Rev. 4], Section 3.4.2.1)

TRUPACT-II Requirements for Packaging:

The fissile or fissionable radionuclide content of CH-TRU waste in the TRUPACT-II, including two times the measurement error, shall be less than 200 grams for a 55-gallon drum or less than 325 grams for a SWB. The sum of the fissile equivalents of all waste packages in the entire payload quantity (including two times the error) may not exceed 325 grams. See the calculational methods detailed in Appendix 1.3.7 of the TRUPACT-II SARP for details. (DOE/WIPP-069 [Rev. 4], Section 3.4.2.2)

Compliance Method: Levels of TRU nuclides associated with this waste stream are such that the waste is not considered fissile material. In any event, the material shall be limited so that an infinite array of such packages will remain subcritical. The waste meets the requirements of Title 49 CFR 173.451, "Fissile Material - General Requirements." Control measures are defined in Building 612 Facility Safety Procedure.

The PU-239 FGE will be calculated as required in Appendix 1.3.7 of the TRUPACT-II SARP.

(3) **Nuclear Heating**

NTS Requirements:

The quantity of radioactive materials shall be limited for each waste matrix and package type so that the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity. See Title 49 CFR 173.442, "Thermal Limitations," for temperature limits. (NVO-325 [Rev. 1], Section 5.5.1.2.C)

WIPP Requirements For Thermal Heating in Contact-Handled Waste:

Individual CH-TRU waste packages in which the average thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) shall have the thermal power recorded in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.6.1)

Compliance Method: Levels of radionuclides associated with this waste stream are limited; therefore, the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or the integrity of the package.

Individual CH-TRU waste packages in which the thermal power density exceeds 0.1 watt/ft^3 (3.5 watt/m^3) will have the thermal power recorded on the data package.

LLNL calculates the thermal power of each waste package and compares it to the allowed values for the package's TRUCON shipping category. If the allowed value is exceeded, the package will not be certified for shipment in TRUPACT-II.

(4) **Radiation Levels**

NTS Requirement:

The external radiation levels for packages shall not exceed 200 mrem/hr on contact during handling, shipment, and disposal unless specifically excepted by DOT regulations. See Title 49 CFR 173.441, "Radiation Level Limitations." Type B containers that will be unloaded by remote procedures will be addressed on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.2.D)

WIPP Requirement for Surface Dose Rate and TRUPACT-II Requirements:

Waste Packages shall have a maximum surface dose rate at any point no greater than 200 mrem/hr. Neutron contributions of greater than 20 mrem/hr. to the total waste package dose rate shall be reported separately in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.1)

The external dose rates on the loaded TRUPACT-II placed on the trailer are limited to 200 mrem/hr at the surface of the TRUPACT-II and 10 mrem/hr at two meters. Dose rates on the TRUPACT-II must comply with 10 CFR 71.47. Drums or SWBs shall not exceed the 200 mrem/hr surface reading or 10 mrem/hr at two meters. Shielded waste containers are allowed for As Low As Reasonably Achievable (ALARA) purposes only and must comply with Section 12.0 of Appendix 1.3.7 of the TRUPACT-II SARP. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.2)

Compliance Method: Packages will be surveyed externally for radiation levels in accordance with 49 CFR 173.441. External radiation levels for containers shall not exceed 200 mrem/hr on contact and 10 mrem/hr at two meters. Neutron contributions of

greater than 20 mrem/hr to the total waste package dose rate will be recorded separately in data package. Drums will not exceed the 200 mrem/hr surface reading. Surface readings will comply with 10 CFR 71.47. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(5) External Contamination

NTS Requirements:

Packages shall be within DOT contamination limits upon receipt at the NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325 [Rev. 1], Section 5.5.1.2.E)

WIPP Requirement for Removable Surface Contamination in Contact-Handled Waste:

Removable surface contamination on waste packages or package assemblies to be emplaced in WIPP shall not be greater than 50 picocuries per 100 cm² for alpha-emitting radionuclides and 450 picocuries per 100 cm² for beta-gamma-emitting radionuclides. Fixation of surface contamination to meet the above criterion is not permitted. (DOE/WIPP-069 [Rev. 4], Section 3.4.5)

Compliance Method: Packages will be surveyed for nonfixed (removable) radioactive contamination on each waste container surface to ensure levels are in accordance with 49 CFR 173.443 and the WIPP/WAC requirements. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(6) Activity Limits

NTS Requirements:

The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type A and Type B Packages," shall be met. Where applicable, the activity limits of Titles 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low Specific Activity Radioactive Materials," shall be met for strong, tight packages. See NVO-325 (Rev. 1), Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325 [Rev. 1], Section 5.5.1.2.F)

WIPP Requirements For Specific Activity and Pu-239 Equivalent Activity in Contact-Handled Waste:

For the purpose of TRU waste certification, the lower limit of greater than 100 nCi/g of TRU radionuclides in the waste shall be interpreted as greater than 100 nCi/g of waste matrix. The

weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and RA-226). Documented evidence shall exist to show that the specific activity of any TRU waste package is greater than 100 nCi/g of waste and that the activity of RH-TRU waste does not exceed 23 Ci/liter. (DOE/WIPP-069 [Rev. 4], Section 3.3.6)

Waste packages shall not exceed 1000 Ci of Pu-239 equivalent activity (PE-Ci). Documented analyses shall be available to show that each package meets the limit. (DOE/WIPP-069 [Rev. 4], Section 3.4.3)

Compliance Method: The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type B Packages," shall be met, when applicable. The activity limits for Title 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low-Specific Activity Radioactive Materials," are not applicable. Waste shall meet the requirements of Title 10 CFR 61. The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. LLNL calculates Pu-239 equivalent curies for each waste package and certifies that it does not exceed 1000 PE-Ci. The determination of nuclide concentrations is performed in accordance with the Building 251 and 332 Procedures and DOE/WIPP-069 [Rev. 4], Section 3.4.3. Remote handled waste will not be sent to the NTS for interim storage. Activities of the waste will be such that shielding within the waste packages will not be required and all external dose rates will be within the DOT requirements for Type A packaging.

(7) Multiple Hazards

NTS Requirements:

Waste containing multiple hazards shall be packaged according to the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." Currently, the NTS does not accept mixed waste for storage or disposal. (NVO-325 [Rev. 1], Section 5.5.1.2.G)

WIPP Requirements For TRU Mixed Wastes in Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with transuranics. Waste packages containing hazardous waste shall be identified with the appropriate

DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D. The basis for the identification of the hazardous wastes will be process knowledge supplemented with sampling. (DOE/WIPP-069 [Rev. 4], Section 3.3.5)

Compliance Method: Materials associated with this waste stream are characterized to assure that no multiple hazards exist as described in building-specific procedures. No TRU waste containing hazardous constituents will be sent to the NTS for storage.

c. NTS Specific Package Criteria

(1) **Closure**

NTS Requirements:

The package closure shall be sturdy enough that it will not be breached under normal handling conditions and will not serve as a weak point for package failure. (NVO-325 [Rev. 1], Section 5.5.1.3.A)

WIPP Requirement For Waste Containers in Contact-Handled Waste:

Waste containers shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/WIPP-069 [Rev. 4], Section 3.2.1)

Compliance Method: Each package shall be closed and sealed to prevent leakage during normal handling. Closure will not serve as a weak point for package failure. All waste containers will be handled and stored in a manner that will not compromise its Type A packaging. Building 332/251 procedures, HWM Procedure 203.

(2) **Strength**

NTS Requirements:

Except for bulk waste, waste packaged in steel drums, or SEALAND® containers, the waste package (packaging and contents) shall be capable of supporting a uniformly distributed load of 19,528 kg/m² (4,000 lb/ft²). This is required to support other waste packages and earth cover without crushing during stacking and covering operations. (NVO-325 [Rev. 1], Section 5.5.1.3.B)

WIPP Requirement - see Closure, above.

Compliance Method: Bulk (nonmixed) TRU waste will not be sent to the NTS for storage. SEALAND® containers will not be used for packaging TRU waste. All nonmixed TRU waste will be packaged in WIPP-acceptable packaging, namely, steel drums or steel TRUPACT-II Standard Waste Boxes or Ten Drum Overpacks. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications.

(3) Handling

NTS Requirements:

All waste packages shall be provided with permanently attached skids, cleats, offsets, rings, handles, or other auxiliary lifting devices to allow handling by means of forklifts, cranes, or similar handling equipment. Lifting rings and other auxiliary lifting devices on the package are permissible, provided they are recessed, offset, or hinged in a manner that does not inhibit stacking the packages. The lifting devices must be designed to a 5:1 safety factor based on the ultimate strength of the material. All rigging devices that are not permanently attached to the waste package must have a current load test based on 125 percent of the safe working load. (NVO-325 [Rev. 1], Section 5.5.1.3.C)

WIPP Requirements:

All waste packages shall be provided with cleats, offsets, chimes (SIC), skids or 7-pack handling fixture for handling by means of fork trucks, cranes, or similar handling devices. Lifting rings and other auxiliary lifting devices on the waste packages, if provided, shall be recessed, offset, or hinged in a manner which does not inhibit stacking the waste packages. (DOE/WIPP-069 [Rev. 4], Section 3.2.3.1)

Compliance Method: Waste packages shall be provided with permanently attached skids, cleats, offsets, chimes, rings, handles, or other auxiliary lifting devices to allow handling by means of a forklift, crane, or similar handling equipment. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications. The LLNL TRU Waste Program Certification and QA Plan specifies certification program responsibilities for TRU waste package specifications.

(4) Size

NTS Requirements:

1.2- x 1.2- x 2.1-m (4- x 4- x 7-ft) or 1.2- x 0.6- x 2.1-m (4- x 2- x 7-ft) (width, height, length) boxes or 208-liter (55-gallon) drums are required to be used. Bulk waste container approval is discussed in NVO-325 (Rev. 1), Section 5.5.4. While these sizes allow optimum stacking efficiency in disposal cells, other dimensions are acceptable with approval from DOE/NV on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.3.D)

WIPP Requirements:

Contact-handled TRU waste packages or package assemblies shall not exceed 12- x 8- x 8.5-feet (3.7- x 2.4- x 2.6-m) in overall length x width x height dimensions. (DOE/WIPP-069 [Rev. 4], Section 3.2.2.1)

Compliance Method: Only WIPP-approved, TRUPACT-II acceptable packaging will be shipped to the NTS. Container specifications are maintained by the LLNL Supply and Distribution Department (TRU Waste Program Certification and QA Plan).

(5) Weight

NTS Requirements:

In addition to the weight limits set for specific packaging designs, NTS imposes limits of 4,082 kg (9,000 pounds) per box; and 544 kg (1,200 pounds) per 208-liter (55-gallon) drum. Packages exceeding 4,082 kg (9,000 pounds) require crane or large forklift removal and must be approved by the REEC Co Waste Operations Department prior to shipment. Shipments of this type must be in a removable-top or removable-side trailer. (NVO-325 [Rev. 1], Section 5.5.1.3.E)

WIPP Requirements:

The following weight limits shall apply for waste package assemblies transported in the TRUPACT-II package:

- ***1,000 lbs per drum***
- ***1,450 lbs per drum overpacked in a SWB***
- ***4,000 lbs per SWB***
- ***7,265 lbs per TRUPACT-II payload***

- **19,250 lbs per TRUPACT-II payload, including the weight of the TRUPACT-II.**

Recent enhancements in the TRUPACT-II design have resulted in an average payload weight of approximately 6,200 lbs. The total weight of the top seven-pack of drums or SWB including error shall be less than or equal to the total weight including error of the lower seven-pack of drums or SWB. The DOT limit of 80,000 lbs gross vehicle weight (GVW) must also be met.

Compliance Method: Waste packages are weighed per HWM Procedure 203 to assure gross weight does not exceed permissible NTS, WIPP, or TRUPACT-II weight limits.

(6) Loading

NTS Requirements:

Waste packages shall be loaded to ensure that the interior volume is as efficiently and compactly loaded as practical. High-density loading will allow efficient RWMS space utilization and provide a more stable waste form that will reduce subsidence and enhance the long-term performance of the disposal site. (NVO-325 [Rev. 1], Section 5.5.1.3.F)

WIPP Requirements - None

Compliance Method: This requirement is not applicable as nonmixed TRU waste will not be offered for disposal at the NTS. Waste packages shall be loaded as efficiently and completely as possible. HWM Procedure 204 is currently utilized for the loading of the Polypanther Type B shipping cask. This procedure will be revised if loading operations switch to the use of the TRUPACT-II or other Type B shipping casks.

(7) Nonstandard Type A Packaging

NTS Requirements:

Use of DOT Type A packages not previously evaluated under the DOE Type A Package Certification Program (see MLM-3245, etc.) will not be permitted. (NVO-325 [Rev. 1], Section 5.5.1.3.G)

WIPP Requirements - None

Compliance Method: Nonstandard Type A Packaging will not be used for TRU waste disposal. Packaging shall meet NTS and

WIPP criteria. Refer to LLNL Hazardous Materials Transportation Safety Manual.

(8) Package Protection

NTS Requirements:

The generator shall take the following precautions to protect the waste package after closure.

- (a) The preshipment storage environment shall be controlled to avoid adverse influence from weather or other factors on the containment capability of the waste packaging during handling, storage, and transport. The generator preparing waste for preshipment storage shall take all reasonable precautions to preclude the accumulation of moisture on or in packages prior to their arrival at the NTS.***
- (b) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.***
- (c) Each waste package shall be prepared for shipment so as to minimize damage during transit. Minor damage incurred during transit, not attributable to poor packaging, will be repaired at the NTS without charge to the waste generator. Costs for repairs of damage caused by waste generator or carrier negligence, as well as any necessary decontamination to meet DOE Order 5480.11, will be charged to the waste generator. (NVO-325 [Rev. 1], Section 5.5.1.3.H)***

WIPP Requirements - None

Compliance Method: LLNL will prepare its waste shipments to minimize damage during shipment and storage. TIDs will be placed on each container upon completion of certification. TRU Waste Program Certification and QA Plan and Procedures Building 332 FSP, Appendix H, MM-VI-3, and HWM 204.

(9) Marking and Labeling

NTS Requirements:

Each waste package shall have the following information:

- (a) Marking and labeling as required in Title 49 CFR 172, Subparts D and E.***

- (b) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (See Figure 8, page 76 of the NVO-325 (Rev. 1)). If the waste is unpackaged bulk, a signed NV-211 label must accompany the shipment papers. These labels can be obtained from REEC Co.**
- (c) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REEC Co (see Appendix D in the NVO-325 (Rev. 1)); one alpha-character for type of waste - M for MW, T for TRU, or X for TRUMW; two numeric characters for current fiscal year; three numeric characters for shipment sequence. Example MDL90001 would mean a shipment from EG&G Mound of low-level waste in fiscal year 1990 and the first shipment.**
- (d) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.**
- (e) Approved 13-digit waste stream identification number (see Section 5.1 in NVO-325 (Rev. 1)).**
- (f) Package weight in units of pounds and kilograms. (NVO-325 [Rev. 1], Section 5.5.1.3.1)**

WIPP Requirements:

- (g) In addition to DOT labeling requirements, each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.**
- (h) The identification marking must be reasonably expected to remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground. (DOE/WIPP-069 [Rev. 4], Section 3.4.8.1)**
- (i) The shipper shall assign a unique shipment number to each shipment. The shipment number consists of the two-letter shipping site identification code specified in Table B-3, followed by the last two digits of the year of transport to the WIPP, and the next consecutive four digit shipment number for the site. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.3)**

- (j) *When the interim storage site (rather than the generating site) packages drums into a package assembly, the interim storage site assigns the package assembly number. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.7)*

Compliance Method:

- (a) All waste packages will be marked and labeled in accordance with 49 CFR 172, Subparts D and E. Procedures HWM 203 and 204.
- (b) An NV-211, "Packaging Certification" label will be completed and signed by the Waste Certification Official or Waste Certification Engineer and affixed to each container. HWM Procedure 204.
- (c) The shipment number shall consist of eight characters. The first two characters will be "L" and "L" (assigned by REECO); the third character will be "T" for transuranic waste; the fourth and fifth characters will represent the fiscal year (i.e., 93); and the last three characters will be the shipment number, consecutively numbered from the first shipment by LLNL to the NTS each fiscal year. Example: LLT93001. HWM Procedure 204.
- (d) LLNL will supply a unique six-character number for each package within a shipment.
- (e) The waste stream identification number shall be 13 characters in length. The first four characters will be the DOE-assigned Waste Management Information System (WMIS) generator code and the remaining nine characters are the generator-assigned waste stream code. Example: BCLA-TRU000001.
- (f) The package weight will be marked on the container in both pounds and kilograms in characters at least one-half inch in height. HWM Procedure 203.
- (g) Each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be at least medium density Code 39 barcode symbology in characters at least one inch high, and alphanumeric characters at least one-half inch high.
- (h) The identification marking will remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground.

- (i) This requirement is not applicable as NTS is the interim storage site and is required to be the shipper to the WIPP disposal site.
- (j) NTS, as the interim storage site (rather than the generating site), will package the drums into a package assembly, the interim storage site assigns the package assembly number.

(10) Barcoding

NTS Requirements:

The shipment, package, and waste stream identification numbers shall be barcoded according to the following standards:

- (a) ***Code 39.***
- (b) ***Medium to high density, high density preferred.***
- (c) ***1.0" high barcode.***
- (d) ***Human readable interpretation (HRI) 0.50" high printed below the barcode.***
- (e) ***Spacing between barcode and HRI will be 0.10".***
- (f) ***Minimum left and right margin (quiet zones) will be at least 0.25".***
- (g) ***All barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number, and waste stream identification number.***
- (h) ***A total of two barcode labels shall be placed on each box or nonstandard package near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top.***
- (i) ***A sample barcode must be submitted to REECo/WMD prior to the first shipment to ensure that REECo/WMD equipment can be used to read the barcode. (NVO-325 [Rev. 1], Section 5.5.1.3.J)***

WIPP Requirements:

The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in

characters at least one inch high, and alphanumeric characters at least one-half inch high.

Compliance Method: LLNL barcoding will comply with DOE/NV requirements and meet the following requirements:

- (a) Code 39.
 - (b) Medium density.
 - (c) Barcode will be 1.0" high.
 - (d) Human readable interpretation 0.50" high will be printed below the barcode.
 - (e) Spacing between barcodes and HRI will be 0.10".
 - (f) Left and right margins will be at least 0.25".
 - (g) Barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number; and waste stream identification number.
 - (h) A total of two barcode labels shall be placed on each TRUPACT-II Standard Waste Box near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top. Each box and drum will also have LLNL's WIPP-required barcode labels. These are of the form "LL85n nnnnnTRU, where each n is a single-digit number. For each drum, one of these TRU barcode labels will be placed on the top of the drum lid and three on the side near the bottom. For each box, one TRU barcode label will be placed on the top and one on each of the four sides. Procedures for applying TRU barcodes are found in HWM 202. Procedures for applying the NTS-required barcode labels will be documented in a revision of HWM Procedure 204.
 - (i) A sample barcode will be submitted to REEC Co prior to the first shipment.
- (11) Onsite Transfer

NTS Requirements:

Onsite transfer must be in accordance with NV 54XG.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpackaged bulk material having external contamination, that contamination shall be

***fixed, covered, or contained sufficiently for safe transfer.
(NVO-325 [Rev. 1], Section 5.5.1.3.K)***

WIPP Requirements - None

Compliance Method: Not applicable.

d. **Additional Criteria For Mixed Waste**

NTS Requirements:

In addition to meeting all of the TRU WAC, mixed waste offered for disposal at the Area 5 RWMS Mixed Waste Management Unit (MWMU) must meet the criteria described in NVO-325 (Rev. 1), Section 5.5.2.

Compliance Method: Not applicable as mixed TRU waste will not be sent to the NTS.

e. **Additional Criteria For Transuranic/Transuranic Mixed Waste**

NTS Requirements:

Requests for storage of all TRU waste will be considered on a case-by-case basis only. (NVO-325 [Rev. 1], Section 5.5.3)

Compliance Method: LLNL is requesting to ship nonmixed TRU waste to the NTS for interim storage until such time that it can be disposed at the WIPP facility.

f. **Additional Criteria For Bulk Waste**

NTS Requirements:

Bulk waste is waste which is disposed of in Area 3. It generally exists in a form not suited to the conventional packaging requirements of Area 5. In addition to meeting the TRU WAC, bulk TRU waste must meet the requirements of Title 49 CFR 173.425(c). Nevada Test Site-generated bulk waste must be transported in accordance with NV 54XG.1A and applicable DOT requirements. Bulk containers must be approved by DOE/NV. (NVO-325 [Rev. 1], Section 5.5.4)

Compliance Method: Not applicable as bulk nonmixed TRU waste will not be shipped to the NTS.

g. Additional Criteria for Case-by-Case Waste

NTS Requirements:

In addition to meeting LLW WAC, the following case-by-case waste types offered for disposal at the NTS must meet the criteria described below. (NVO-325 [Rev. 1], Section 5.5.5)

WIPP Requirements - None

- (1) **Weight:** (NVO-325 [Rev. 1], Section 5.5.5.1) - See Section III.A.5.c(5), "Weight."
- (2) **Activity Limits:** (NVO-325 [Rev. 1], Section 5.5.5.2) - See Section III.A.5.b(6), "Activity Limits."
- (3) **Radioactively Contaminated Asbestos:** (NVO-325 [Rev. 1], Section 5.5.5.3)

Compliance Method: Nonmixed TRU waste containing regulated asbestos will not be shipped to the NTS.

- (4) **DOE Comparable Greater than Class C:** (NVO-325 [Rev. 1], Section 5.5.5.4)

Compliance Method: LLNL nonmixed TRU waste may be greater than Class C. LLNL nonmixed TRU waste is not being offered for disposal, but rather for interim storage.

- (5) **Classified Waste Streams:** (NVO-325 [Rev. 1], Section 5.5.5.5) - Not applicable.
- (6) **Radioactive Animal Carcasses:** (NVO-325 [Rev. 1], Section 5.5.5.6) - Not applicable.
- (7) **Other Waste Forms:** (NVO-325 [Rev. 1], Section 5.5.5.7) - Not applicable.

h. Additional TRU Requirements for WIPP:

(1) New Mexico Environmental Department Requirements:

The NMED has the authority to promulgate additional requirements for the management of TRU mixed waste and to issue site-specific permit conditions during the RCRA permitting process. The NMED has not yet stipulated additional requirements for the mixed waste program. Future requirements, as applicable to the WIPP WAC, will be incorporated into this document as they become known. (DOE/WIPP-069 [Rev. 4], Section 3.6.1.3)

Compliance Method: Not applicable as LLNL will not ship TRU mixed waste to the NTS for interim storage at this time.

6. Waste Stream Characterization Data Sheet: (NVO-325 [Rev. 1], Section 5.6)

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: BCLA-TRU0000002
2. Waste Description: This waste stream consists of solidified liquids from Buildings 332 and 251.
 - a. Physical Characteristics: Waste stream is solidified liquid waste.
 - b. Special Handling/Disposal Requirements: None required.
3. Basis for Characterization:
 - a. Process Knowledge: X
 - b. Analytical Knowledge: _____
 - c. Both: _____

(If B or C, provide Standardized Data Reporting Forms as necessary.)
4. Radioactive Characteristics:
 - a. Is Waste > NRC Class C (See Title 10 CFR 61.55)? Yes
 - b. WMIS Nuclide Category (circle) ① 2 3 4 5 NA 7 8

(Choose the highest predominant nuclide. The number 6 is not an option.)
- c. Radioactive Constituents:

Specific Activity Range of Waste Streams

	Nuclide	Chemical Forms	Minimum	Mean	Maximum	Units
1	Am-241	metal oxide	0.	3.46E-03	3.32E-01	Ci/kg
2	Am-242m	metal oxide	0.	6.84E-06	2.29E-02	Ci/kg
3	Am-243	metal oxide	0.	6.87E-07	1.02E-03	Ci/kg
4	Cf-249	metal oxide	0.	7.23E-09	1.59E-05	Ci/kg
5	Cm-244	metal oxide	0.	2.53E-03	2.73E+00	Ci/kg
6	Cm-246	metal oxide	0.	1.80E-08	8.55E-06	Ci/kg
7	Cs-137	metal oxide	0.	6.63E-11	1.58E-08	Ci/kg
8	Eu-152	metal oxide	0.	4.66E-11	1.11E-08	Ci/kg
9	Eu-154	metal oxide	0.	1.76E-11	4.19E-09	Ci/kg
10	Np-237	metal oxide	0.	8.59E-09	1.39E-05	Ci/kg
11	Pu-238	metal oxide	0.	1.84E-03	3.83E-01	Ci/kg
12	Pu-239	metal oxide	0.	3.98E-03	7.19E-02	Ci/kg
13	Pu-240	metal oxide	0.	1.68E-03	3.80E-02	Ci/kg
14	Pu-241	metal oxide	0.	5.16E-02	1.16E+00	Ci/kg
15	Pu-242	metal oxide	0.	5.43E-07	2.60E-05	Ci/kg
16	Sb-125	metal oxide	0.	5.29E-12	1.26E-09	Ci/kg
17	Th-228	metal oxide	0.	1.06E-12	2.53E-10	Ci/kg
18	U-235	metal oxide	0.	7.23E-11	7.11E-08	Ci/kg
19	U-238	metal oxide	0.	9.85E-09	5.03E-06	Ci/kg

Figure 8. Waste Stream Characterization Data Sheet - BCLA-TRU0000002 - Page 1

WASTE STREAM CHARACTERIZATION DATA SHEET (continued)

5. Hazardous Components (for mixed waste): Not Applicable
 - a. Basis for Identifying as mixed waste : Not Applicable
 - b. List the applicable EPA waste code, the chemical name, the treatment performed (if applicable) and the regulatory/treatment standard. Attach Standardized Data Reporting Forms. Not Applicable

7. Waste Forecasting: (Three-Year Waste Shipment Forecast) (NVO-325
[Rev. 1], Section 5.7)

THREE-YEAR WASTE SHIPMENT FORECAST							
GENERATOR: LLNL			PREPARED BY: KEM HAINEBACH DATE: 11/30/93				
FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME (m³)
			TYPE	SIZE	NO. OF CONTAINERS		
FY 1994 10/1 - 12/31					0	0	
1/1 - 3/31					0	0	
4/1 - 6/30					0	0	
7/1 - 9/30					0	0	
FY 1995	BCCLA-TRU0000002	TRU	METAL DRUM	55 GALLON	0	0	0
FY 1996	BCCLA-TRU0000002	TRU	METAL DRUM	55 GALLON	0	0	0

REMARKS NEXT UPDATES DUE 2/14/94 AND 8/15/94

Figure 9. Three-Year Waste Shipment Forecast - BCCLA TRU0000002

8. Packaging and Shipping Information:

Include the DOT proper shipping name, hazard class, and hazard identification number. (NVO-325 [Rev. 1], Section 5.8)

Compliance Method: TRU shipments will be classed as follows (HWM Procedure 204):

- Department of Transportation Shipping Name - Radioactive Material N.O.S.
- Hazard Class - Radioactive Material
- Hazard Identification Number UN 2982

9. Waste Security Information:

Provide information regarding any special security requirements. (NVO-325 [Rev. 1], Section 5.9)

Compliance Method: No security requirements are necessary for Waste Stream BCLA-TRU0000002.

C. Metal Scrap Waste

1. Waste Stream Identification Number: BCLA-TRU0000003
2. Waste Type: Nonmixed Transuranic
3. Waste Stream Description: This waste stream consists of contaminated material that usually cannot be handled as waste streams BCLA-TRU0000001 or BCLA-TRU0000002 because of size. This waste stream is composed primarily of objects that, because of physical size, cannot always be packaged in a 55-gallon drum. For oversized objects, a TRUPACT-II SWB is used as the TRU waste container. Typical objects in this waste stream include decommissioned glove boxes, hoods, and contaminated equipment (lathes, mills, etc.).
4. Waste Certification Flow Diagram: See Figure 10
5. Waste Acceptance Criteria:
 - a. General Waste Form Criteria

- (1) Transuranics

NTS Requirements:

Requests for interim storage of all TRU waste will be considered on a case-by-case basis.

TRU waste must meet all the NVO-325 (Rev. 1) WAC - including DOE/HQ designation, application to DOE/NV, and participation in the waste generator approval process. TRU waste is only accepted at the NTS for interim storage prior to shipment to the Waste Isolation Pilot Plant. In addition, the generator will be required to provide documentation with their application that the waste is certified to the WIPP WAC, per NVO-325 (Rev. 1), Section 5.5.3.

WIPP Requirements For Contact-Handled Waste:

For purposes of TRU waste certification, the lower limit of >100 nCi/g of TRU radionuclides in the waste shall be interpreted as >100 nCi per gram of waste matrix. The weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and Ra-226) (DOE/WIPP-069 [Rev. 4], Section 3.3.6.1).

Waste Stream BCLA-TRU0000003: Metal Scrap Waste

HWM = Hazardous Waste Management
 GEN = Generator
 LLW = Low-level Waste
 TRU = Transuranic
 TRUW = Transuranic Waste
 WCE = Waste Certification Engineer
 WCC = Waste Container Custodian
 WCO = Waste Certification Official

Figure 10. Waste Certification Flow Diagram - BCLA-TRU0000003

Compliance Method: The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. The determination of nuclide concentrations is performed in accordance with either the Building 251 or the Building 332 Procedures.

(2) Hazardous Waste Components

NTS Requirements:

TRU offered for disposal at NTS waste management sites shall not exhibit any characteristics of, or be listed as, hazardous waste as identified in Title 40 CFR 261, "Identification and Listing of Hazardous Waste" or California Code of Regulation, Title 22, Division 4.5, Chapter 11, Section 66261. (NVO-325 [Rev. 1], Section 5.5.1.1.B)

WIPP Requirements For Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with Transuranics. Waste packages containing hazardous waste shall be identified with the appropriate DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D (DOE/WIPP-069 [Rev. 4], Section 3.3.5.1.)

Aqueous materials which have a pH less than 2.0 or greater than 12.5 are prohibited per 40 CFR 261.22(a)(1) . (DOE/WIPP-069 [Rev. 4], Section 3.3.5.2)

Compliance Method: Nonmixed Transuranic wastes for interim storage at NTS will not contain listed hazardous waste or exhibit hazardous waste characteristics as defined in 40 CFR 261 and CCR Title 22, Division 4.5, Chapter 11, Section 66261. The Building 251 and 332 Procedures document administrative and physical controls of materials utilized in each facility to achieve compliance with this requirement. Personnel responsible for identifying, characterizing, and certifying TRU waste shall receive training on the Federal and State of California characteristic and listed hazardous wastes.

(3) Free Liquids

NTS Requirements:

Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions. LLW disposed at the NTS waste

management sites shall contain as little free liquids as is reasonably achievable, but in no case shall the liquid equal or exceed 0.5 percent by volume of the external waste container (NVO-325 [Rev. 1], Section 5.5.1.1.C).

WIPP Requirements For Contact-Handled Waste:

Liquid waste will not be emplaced in the WIPP. TRU waste for emplacement in the WIPP shall contain as little residual liquid as is reasonable achievable. All internal containers (e.g., bottles, cans, etc.) must be well-drained, but may contain residual liquids. As a guideline, residual liquid in well-drained containers will be restricted to approximately one percent of the volume of the internal container. In no case shall the total liquid equal or exceed one volume percent of the waste container (e.g., drum or standard waste box (SWB)). (DOE/WIPP-069 [Rev. 4], Section 3.3.2.1).

Waste for shipment in TRUPACT-II shall contain less than one volume percent of the waste container as liquids (DOE/WIPP-069 [Rev. 4], Section 3.3.2.2)

Compliance Methods: The WIPP requirement of not more than 1.0% free liquids by volume shall be met. This waste is not offered for disposal at the NTS, but rather for storage and eventual shipment to the WIPP for disposal. Therefore, the NVO-325 (Rev. 1) requirement for 0.5% free liquid by volume is not applicable to this waste. Verification of free liquid content will be provided through RTR.

(4) Particulates

NTS Requirements:

Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent of less-than-ten-micrometer-diameter particles, or 15 weight percent of less-than-200-micrometer-diameter particles. Waste that is known to be in a particulate form or in a form that could mechanically or chemically be transformed to a particulate during handling and interim storage shall be immobilized. When immobilization is impractical, other acceptable waste packaging shall be used, such as the following:

- ***Overpacking (i.e., 55-gallon drum inside 83- or 85-gallon drum);***
- ***steel box with no liner;***
- ***wooden box with a minimum of 6-mil sealed plastic liner;***

- *steel drum with a minimum of 6-mil sealed plastic liner (NVO-325 [Rev. 1], Section 5.5.1.1.D).*

WIPP Requirements For Contact-Handled Waste Immobilization:

Powders, ashes, and similar particulate waste materials shall be immobilized if more than one weight percent of the waste matrix in each package is in the form of particles below ten microns in diameter, or if more than 15 weight percent is in the form of particles below 200 microns in diameter. (DOE/WIPP-069 [Rev. 4], Section 3.3.1.1)

Compliance Method: Nonmixed Transuranic waste is evaluated by process knowledge or segregated and evaluated for particulates in accordance with the Building 332/251 procedures. Fine particulates are not anticipated in this waste stream.

(5) Gases

NTS Requirements:

Transuranic waste gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 1.5 atmospheres at 20°C. Compressed gases as defined by Title 49 CFR 173.300, including unpunctured aerosol cans, will not be accepted for storage or disposal. Aerosol cans will have puncture disfigurements recognizable by Real-Time Radiography (RTR). Expended gas cylinders must have the valve mechanism removed. (NVO-325 [Rev. 1], Section 5.5.1.1.E)

WIPP Requirements For Contact-Handled Waste Explosives and Compressed Gases:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases (WIPP/DOE-069 (Rev. 4), Section 3.3.4.1)

Waste containers with waste that could potentially generate gases shall be vented. (DOE/WIPP-069 [Rev. 4], Section 3.4.7.1)

Compliance Method: Compressed gas as defined by Title 49 CFR 173.300, including unpunctured aerosol cans, will not be disposed in TRU containers. Compressed gases and intact aerosol cans will be segregated. Nonhazardous aerosol cans will be punctured and placed into TRU waste containers in accordance with the Building 332/251 procedures.

LLNL will utilize the WIPP-required carbon composite filters on all nonmixed TRU waste packages.

Headspace gas sampling will be performed to statistically assure hydrogen gas does not exceed required limits.

(6) Stabilization

NTS Requirements:

Where practical, waste shall be treated to reduce volume, promote waste minimization and provide a more structurally and chemically stable waste form. (NVO-325 [Rev. 1], Section 5.5.1.1.F)

WIPP Requirements - None

Compliance Method: Nonmixed Transuranic waste from Buildings 332 and 251 consists primarily of solid materials contaminated with radionuclides and is an inherently stable waste form. Procedures governing stabilization and control measures are performed in accordance with NVO-325 (Rev. 1) as defined in the Building 332/251 procedure.

(7) Etiologic Agents

NTS Requirements:

Transuranic waste containing pathogens, infectious wastes, or other etiologic agents as defined in Title 49 CFR 173.386 will not be accepted for disposal at NTS. (NVO-325 [Rev. 1], Section 5.5.1.1.G)

WIPP Requirements - None

Compliance Method: By process knowledge and administrative controls, etiologic agents are not allowed into Buildings 332 and 251; therefore, there is no potential that etiologic waste could be placed into the TRU waste containers. Control measures are defined in the Building 332/251 procedures.

(8) Chelating Agents

NTS Requirements:

Transuranic waste containing chelating or complexing agents at concentrations greater than one percent by weight of the waste form will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.H)

WIPP Requirements - None

Compliance Method: As determined by process knowledge and administrative controls, chelating and complexing agents in concentrations greater than one percent by weight are not present in Building 332/251. If chelating agents are suspected to be present, TRU waste will be segregated for further analysis. Control measures are defined in the Building 332/251 procedures.

(9) Polychlorinated Biphenyls (PCBs)

NTS Requirements:

PCB-contaminated TRU waste will not be accepted for disposal at the NTS unless the PCB concentration meets municipal solid waste disposal levels of 50 ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325 [Rev. 1], Section 5.5.1.1.I)

WIPP Requirements - None

Compliance Method: Inventory controls shall be used to assure that PCBs are at levels that may be managed as municipal solid waste by both State of California and Federal standards (5 ppm and 50 ppm, respectively).

(10) Explosives and Pyrophorics

NTS Requirements:

Transuranic waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust if the container is breached, will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.J)

WIPP Requirements For Explosives and Compressed Gases in Contact-Handled Waste:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases. (DOE/WIPP-069 [Rev. 4], Section 3.3.4.1)

WIPP Requirement For Pyrophoric Materials in Contact-Handled Wastes:

Pyrophoric materials, other than radionuclides, shall be rendered safe by mixing them with chemically stable materials (e.g., concrete, glass) or shall be processed to remove their hazardous properties. Not more than one percent by weight of the waste in each waste container may be pyrophoric forms of

radionuclides, and these shall be generally dispersed in the waste. (DOE/WIPP-069 [Rev. 4], Section 3.3.3.1)

Compliance Method: Plutonium fines are diffused throughout the waste matrix. Nonradioactive fines are solidified if pyrophoric. Nonmixed TRU waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust will not be shipped to the NTS for storage.

b. General Regulatory Waste Package Criteria

(1) Design

NTS Requirements:

Type A packaging shall be designed to meet Title 49 CFR 173.411, "General Design Requirements," and Title 49 CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOE Type A Package Certification Program (see MLM-3245, "DOT-7A Type A Certification Document," or succeeding DOE publication). Type B packaging must meet the applicable requirements of Title 10 CFR 71. Strong, tight packaging used for shipping limited quantities and low specific activity TRU waste excepted by Titles 49 CFR 173.421 and 173.425, respectively, must be constructed so that it will not leak during normal transportation and handling conditions. (NVO-325 [Rev. 1], Section 5.5.1.2.A)

WIPP Requirements For Waste Containers in Contact-Handled Waste:

Waste containers for emplacement in the WIPP shall be noncombustible and meet all applicable requirements of 49 CFR 173.412 for Type A packaging. Waste containers of various sizes, shown to meet Department of Transportation (DOT) Type A requirements by methods detailed in MLM-3245 shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/ WIPP-069 (Rev. 4), Section 3.2.1.1)

Standard 55-gallon (208-liter) metal drums, SWBs, 55-gallon drums overpacked in a SWB, and an experimental bin overpacked in a SWB are authorized for shipment of contact-handled TRU (CH-TRU) waste in TRUPACT-II. (DOE/WIPP-069 [Rev. 4], Section 3.2.1.2)

Compliance Method: LLNL Type A containers shall be designed to comply with 49 CFR 173.411, "General Design Requirements," 49

CFR 173.412, "Additional Design Requirements for Type A packages," and 49 CFR 173.474, "Quality Control for Construction of Packaging." All LLNL TRU waste containers will meet the WIPP/WAC and NVO-325 requirements. All waste packages will be acceptable in TRUPACT-II or other WIPP approved transportation method.

(2) Nuclear Safety

NTS Requirements:

The quantity of fissile radioactive materials shall be limited so that an infinite array of such packages will remain subcritical. This quantity shall be determined on the basis of a specific nuclear safety analysis, considering credible accident situations, and taking into account the actual materials in the waste. See Title 49 CFR 173.451, "Fissile Materials - General Requirements." (NVO-325 [Rev. 1], Section 5.5.1.2.B)

WIPP Requirements For Nuclear Criticality in Contact-Handled Waste:

The fissile or fissionable radionuclide content of CH-TRU waste packages shall be no greater than the following values, in Pu-239 fissile-gram equivalent (FGE): 200 grams per 55-gallon drum (1.21 m³); less than 325 grams for a standard waste box.

The Pu-239 FGE shall be calculated using the methods detailed in Appendix 1.3.7 of the TRUPACT-II Safety Analysis Report For Packaging (SARP). (DOE/WIPP-069 [Rev. 4], Section 3.4.2.1)

TRUPACT-II Requirements for Packaging:

The fissile or fissionable radionuclide content of CH-TRU waste in the TRUPACT-II, including two times the measurement error, shall be less than 200 grams for a 55-gallon drum or less than 325 grams for a SWB. The sum of the fissile equivalents of all waste packages in the entire payload quantity (including two times the error) may not exceed 325 grams. See the calculational methods detailed in Appendix 1.3.7 of the TRUPACT-II SARP for details. (DOE/WIPP-069 [Rev. 4], Section 3.4.2.2)

Compliance Method: Levels of TRU nuclides associated with this waste stream are such that the waste is not considered fissile material. In any event, the material shall be limited so that an infinite array of such packages will remain subcritical. The waste meets the requirements of Title 49 CFR 173.451, "Fissile Material -

General Requirements." Control measures are defined in Building 612 Facility Safety Procedure.

The PU-239 FGE will be calculated as required in Appendix 1.3.7 of the TRUPACT-II SARP.

(3) Nuclear Heating

NTS Requirements:

The quantity of radioactive materials shall be limited for each waste matrix and package type so that the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity. See Title 49 CFR 173.442, "Thermal Limitations," for temperature limits. (NVO-325 [Rev. 1], Section 5.5.1.2.C)

WIPP Requirements For Thermal Heating in Contact-Handled Waste:

Individual CH-TRU waste packages in which the average thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) shall have the thermal power recorded in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.6.1)

Compliance Method: Levels of radionuclides associated with this waste stream are limited; therefore, the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or the integrity of the package.

Individual CH-TRU waste packages in which the thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) will have the thermal power recorded on the data package.

LLNL calculates the thermal power of each waste package and compares it to the allowed values for the package's TRUCON shipping category. If the allowed value is exceeded, the package will not be certified for shipment in TRUPACT-II.

(4) Radiation Levels

NTS Requirement:

The external radiation levels for packages shall not exceed 200 mrem/hr on contact during handling, shipment, and disposal unless specifically excepted by DOT regulations. See Title 49 CFR 173.441, "Radiation Level Limitations." Type B containers that will be unloaded by remote procedures will be addressed on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.2.D)

WIPP Requirement for Surface Dose Rate and TRUPACT-II Requirements:

Waste Packages shall have a maximum surface dose rate at any point no greater than 200 mrem/hr. Neutron contributions of greater than 20 mrem/hr. to the total waste package dose rate shall be reported separately in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.1.

The external dose rates on the loaded TRUPACT-II placed on the trailer are limited to 200 mrem/hr at the surface of the TRUPACT-II and 10 mrem/hr at two meters. Dose rates on the TRUPACT-II must comply with 10 CFR 71.47. Drums or SWBs shall not exceed the 200 mrem/hr surface reading or 10 mrem/hr at two meters. Shielded waste containers are allowed for As Low As Reasonably Achievable (ALARA) purposes only and must comply with Section 12.0 of Appendix 1.3.7 of the TRUPACT-II SARP. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.2)

Compliance Method: Packages will be surveyed externally for radiation levels in accordance with 49 CFR 173.441. External radiation levels for containers shall not exceed 200 mrem/hr on contact and 10 mrem/hr at two meters. Neutron contributions of greater than 20 mrem/hr to the total waste package dose rate will be recorded separately in data package. Drums or SWBs will not exceed the 200 mrem/hr surface reading. Surface readings will comply with 10 CFR 71.47. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(5) External Contamination

NTS Requirements:

Packages shall be within DOT contamination limits upon receipt at the NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325 [Rev. 1], Section 5.5.1.2.E)

WIPP Requirement for Removable Surface Contamination in Contact-Handled Waste:

Removable surface contamination on waste packages or package assemblies to be emplaced in WIPP shall not be greater than 50 picocuries per 100 cm² for alpha-emitting radionuclides and 450 picocuries per 100 cm² for beta-gamma-emitting radionuclides. Fixation of surface contamination to meet the above criterion is not permitted. (DOE/WIPP-069 [Rev. 4], Section 3.4.5)

Compliance Method: Packages will be surveyed for nonfixed (removable) radioactive contamination on each waste container surface to ensure levels are in accordance with 49 CFR 173.443 and the WIPP/WAC requirements. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(6) **Activity Limits**

NTS Requirements:

The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type A and Type B Packages," shall be met. Where applicable, the activity limits of Titles 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low Specific Activity Radioactive Materials," shall be met for strong, tight packages. See NVO-325 (Rev. 1), Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325 [Rev. 1], Section 5.5.1.2.F)

WIPP Requirements For Specific Activity and Pu-239 Equivalent Activity in Contact-Handled Waste:

For the purpose of TRU waste certification, the lower limit of greater than 100 nCi/g of TRU radionuclides in the waste shall be interpreted as greater than 100 nCi/g of waste matrix. The weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and RA-226). Documented evidence shall exist to show that the specific activity of any TRU waste package is greater than 100 nCi/g of waste and that the activity of RH-TRU waste does not exceed 23 Ci/liter. (DOE/WIPP-069 [Rev. 4], Section 3.3.6)

Waste packages shall not exceed 1000 Ci of Pu-239 equivalent activity (PE-Ci). Documented analyses shall be available to show that each package meets the limit. (DOE/WIPP-069 [Rev. 4], Section 3.4.3)

Compliance Method: The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type B Packages," shall be met, when applicable. The activity limits for Title 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low-Specific Activity Radioactive Materials," are not applicable. Waste shall meet the requirements of Title 10 CFR 61. The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. LLNL calculates Pu-239

equivalent curies for each waste package and certifies that it does not exceed 1000 PE-Ci. The determination of nuclide concentrations is performed in accordance with the Building 251 and 332 Procedures and DOE/WIPP-069 [Rev. 4], Section 3.4.3. Remote handled waste will not be sent to the NTS for interim storage. Activities of the waste will be such that shielding within the waste packages will not be required and all external dose rates will be within the DOT requirements for Type A packaging.

(7) Multiple Hazards

NTS Requirements:

Waste containing multiple hazards shall be packaged according to the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." Currently, the NTS does not accept mixed waste for storage or disposal. (NVO-325 [Rev. 1], Section 5.5.1.2.G)

WIPP Requirements For TRU Mixed Wastes in Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with transuranics. Waste packages containing hazardous waste shall be identified with the appropriate DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D. The basis for the identification of the hazardous wastes will be process knowledge supplemented with sampling. (DOE/WIPP-069 [Rev. 4], Section 3.3.5)

Compliance Method: Materials associated with this waste stream are characterized through process knowledge to assure that no multiple hazards exist as described in building-specific Procedures. No TRU waste containing hazardous constituents will be sent to the NTS for storage.

c. NTS Specific Package Criteria

(1) Closure

NTS Requirements:

The package closure shall be sturdy enough that it will not be breached under normal handling conditions and will not serve as a weak point for package failure. (NVO-325 [Rev. 1], Section 5.5.1.3.A)

WIPP Requirement For Waste Containers in Contact-Handled Waste:

Waste containers shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/WIPP-069 [Rev. 4], Section 3.2.1)

Compliance Method: Each package shall be closed and sealed to prevent leakage during normal handling. Closure will not serve as a weak point for package failure. All waste containers will be handled and stored in a manner that will not compromise its Type A packaging. Building 332/251 procedures, HWM Procedure 203.

(2) Strength

NTS Requirements:

Except for bulk waste, waste packaged in steel drums, or SEALAND® containers, the waste package (packaging and contents) shall be capable of supporting a uniformly distributed load of 19,528 kg/m² (4,000 lb/ft²). This is required to support other waste packages and earth cover without crushing during stacking and covering operations. (NVO-325 [Rev. 1], Section 5.5.1.3.B)

WIPP Requirement - Closure, above.

Compliance Method: Bulk (nonmixed) TRU waste will not be sent to the NTS for storage. SEALAND® containers will not be used for packaging TRU waste. All nonmixed TRU waste will be packaged in WIPP-acceptable packaging, namely, steel drums or steel TRUPACT-II Standard Waste Boxes or Ten Drum Overpacks. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications.

(3) Handling

NTS Requirements:

All waste packages shall be provided with permanently attached skids, cleats, offsets, rings, handles, or other auxiliary lifting devices to allow handling by means of forklifts, cranes, or similar handling equipment. Lifting rings and other auxiliary lifting devices on the package are permissible, provided they are recessed, offset, or hinged in a manner that does not inhibit stacking the packages. The lifting devices must be designed to a 5:1 safety factor based on the ultimate strength of the material. All rigging devices that are not permanently attached to the waste package must

have a current load test based on 125 percent of the safe working load. (NVO-325 [Rev. 1], Section 5.5.1.3.C)

WIPP Requirements:

All waste packages shall be provided with cleats, offsets, chimes (SIC), skids or 7-pack handling fixture for handling by means of fork trucks, cranes, or similar handling devices. Lifting rings and other auxiliary lifting devices on the waste packages, if provided, shall be recessed, offset, or hinged in a manner which does not inhibit stacking the waste packages. (DOE/WIPP-069 [Rev. 4], Section 3.2.3.1)

Compliance Method: Waste packages shall be provided with permanently attached skids, cleats, offsets, chimes, rings, handles, or other auxiliary lifting devices to allow handling by means of a forklift, crane, or similar handling equipment. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications. The LLNL TRU Waste Program Certification and QA Plan specifies certification program responsibilities for TRU waste package specifications.

(4) Size

NTS Requirements:

1.2- x 1.2- x 2.1-m (4- x 4- x 7-ft) or 1.2- x 0.6- x 2.1-m (4- x 2- x 7-ft) (width, height, length) boxes or 208-liter (55-gallon) drums are required to be used. Bulk waste container approval is discussed in NVO-325 (Rev. 1), Section 5.5.4. While these sizes allow optimum stacking efficiency in disposal cells, other dimensions are acceptable with approval from DOE/NV on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.3.D)

WIPP Requirements:

Contact-handled TRU waste packages or package assemblies shall not exceed 12- x 8- x 8.5-feet (3.7- x 2.4- x 2.6-m) in overall length x width x height dimensions. (DOE/WIPP-069 [Rev. 4], Section 3.2.2.1)

Compliance Method: Only WIPP-approved, TRUPACT-II acceptable packaging will be shipped to the NTS. Container specifications are maintained by the LLNL Supply and Distribution Department (TRU Waste Program Certification and QA Plan).

(5) Weight

NTS Requirements:

In addition to the weight limits set for specific packaging designs, NTS imposes limits of 4,082 kg (9,000 pounds) per box and 544 kg (1,200 pounds) per 208-liter (55-gallon) drum. Packages exceeding 4,082 kg (9,000 pounds) require crane or large forklift removal and must be approved by the REEC Co Waste Operations Department prior to shipment. Shipments of this type must be in a removable-top or removable-side trailer. (NVO-325 [Rev. 1], Section 5.5.1.3.E)

WIPP Requirements:

The following weight limits shall apply for waste package assemblies transported in the TRUPACT-II package:

- ***1,00 lbs per drum***
- ***1,450 lbs per drum overpacked in a SWB***
- ***4,000 lbs per SWB***
- ***7,265 lbs per TRUPACT-II payload***
- ***19,250 lbs per TRUPACT-II payload, including the weight of the TRUPACT-II.***

Recent enhancements in the TRUPACT-II design have resulted in an average payload weight of approximately 6,200 lbs. The total weight of the top seven-pack of drums or SWB including error shall be less than or equal to the total weight including error of the lower seven-pack of drums or SWB. The DOT limit of 80,000 lbs gross vehicle weight (GVW) must also be met.

Compliance Method: Waste packages are weighed per HWM Procedure 203 to assure gross weight does not exceed permissible NTS, WIPP, or TRUPACT-II weight limits.

(6) Loading

NTS Requirements:

Waste packages shall be loaded to ensure that the interior volume is as efficiently and compactly loaded as practical. High-density loading will allow efficient RWMS space utilization and provide a more stable waste form that will

reduce subsidence and enhance the long-term performance of the disposal site. (NVO-325 [Rev. 1], Section 5.5.1.3.F)

WIPP Requirements - None

Compliance Method: This requirement is not applicable as nonmixed TRU waste will not be offered for disposal at the NTS. Waste packages shall be loaded as efficiently and completely as possible. HWM Procedure 204 is currently utilized for the loading of the Polypanther Type B shipping cask. This procedure will be revised if loading operations switch to the use of the TRUPACT-II or other Type B shipping casks.

(7) **Nonstandard Type A Packaging**

NTS Requirements:

Use of DOT Type A packages not previously evaluated under the DOE Type A Package Certification Program (see MLM-3245, etc.) will not be permitted. (NVO-325 [Rev. 1], Section 5.5.1.3.G)

WIPP Requirements - None

Compliance Method: Nonstandard Type A Packaging will not be used for TRU waste disposal. Packaging shall meet NTS and WIPP criteria. Refer to LLNL Hazardous Materials Transportation Safety Manual.

(8) **Package Protection**

NTS Requirements:

The generator shall take the following precautions to protect the waste package after closure.

- (a) The preshipment storage environment shall be controlled to avoid adverse influence from weather or other factors on the containment capability of the waste packaging during handling, storage, and transport. The generator preparing waste for preshipment storage shall take all reasonable precautions to preclude the accumulation of moisture on or in packages prior to their arrival at the NTS.***
- (b) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.***

- (c) ***Each waste package shall be prepared for shipment so as to minimize damage during transit. Minor damage incurred during transit, not attributable to poor packaging, will be repaired at the NTS without charge to the waste generator. Costs for repairs of damage caused by waste generator or carrier negligence, as well as any necessary decontamination to meet DOE Order 5480.11, will be charged to the waste generator. (NVO-325 [Rev. 1], Section 5.5.1.3.H)***

WIPP Requirements - None

Compliance Method: LLNL will prepare its waste shipments to minimize damage during shipment and storage. TIDs will be placed on each container upon completion of certification. TRU Waste Program Certification and QA Plan and Procedures Building 332 FSP, Appendix H, MM-VI-3, and HWM 204.

(9) Marking and Labeling

NTS Requirements:

Each waste package shall have the following information:

- (a) ***Marking and labeling as required in Title 49 CFR 172, Subparts D and E.***
- (b) ***Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (See Figure 8, page 76 of the NVO-325 (Rev. 1)). If the waste is unpackaged bulk, a signed NV-211 label must accompany the shipment papers. These labels can be obtained from REECo.***
- (c) ***Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REECo (see Appendix D in the NVO-325 (Rev. 1)); one alpha-character for type of waste - M for MW, T for TRU, or X for TRUMW; two numeric characters for current fiscal year; three numeric characters for shipment sequence. Example MDL90001 would mean a shipment from EG&G Mound of low-level waste in fiscal year 1990 and the first shipment.***
- (d) ***Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.***
- (e) ***Approved 13-digit waste stream identification number (see Section 5.1 in NVO-325 (Rev. 1)).***

- (f) Package weight in units of pounds and kilograms. (NVO-325 [Rev. 1], Section 5.5.1.3.I)**

WIPP Requirements:

- (g) In addition to DOT labeling requirements, each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.**
- (h) The identification marking must be reasonably expected to remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground. (DOE/WIPP-069 [Rev. 4], Section 3.4.8.1)**
- (i) The shipper shall assign a unique shipment number to each shipment. The shipment number consists of the two-letter shipping site identification code specified in Table B-3, followed by the last two digits of the year of transport to the WIPP, and the next consecutive four digit shipment number for the site. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.3)**
- (j) When the interim storage site (rather than the generating site) packages drums into a package assembly, the interim storage site assigns the package assembly number. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.7)**

Compliance Method:

- (a) All waste packages will be marked and labeled in accordance with 49 CFR 172, Subparts D and E. Procedures HWM 203 and 204.**
- (b) An NV-211, "Packaging Certification" label will be completed and signed by the Waste Certification Official or Waste Certification Engineer and affixed to each container. HWM Procedure 204.**
- (c) The shipment number shall consist of eight characters. The first two characters will be "L" and "L" (assigned by REEC0); the third character will be "T" for transuranic waste; the fourth and fifth characters will represent the fiscal year (i.e., 93); and the last three characters will be the shipment number, consecutively numbered from the first shipment by LLNL to**

the NTS each fiscal year. Example: LLT93001. HWM Procedure 204.

- (d) LLNL will supply a unique six-character number for each package within a shipment.
- (e) The waste stream identification number shall be 13 characters in length. The first four characters will be the DOE-assigned Waste Management Information System (WMIS) generator code and the remaining nine characters are the generator-assigned waste stream code. Example: BCLA-TRU000001.
- (f) The package weight will be marked on the container in both pounds and kilograms in characters at least one-half inch in height. HWM Procedure 203.
- (g) Each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be at least medium density Code 39 barcode symbology in characters at least one inch high, and alphanumeric characters at least one-half inch high.
- (h) The identification marking will remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground.
- (i) This requirement is not applicable as NTS is the interim storage site and is required to be the shipper to the WIPP disposal site.
- (j) NTS, as the interim storage site (rather than the generating site), will package the drums into a package assembly, the interim storage site assigns the package assembly number.

(10) Barcoding

NTS Requirements:

The shipment, package, and waste stream identification numbers shall be barcoded according to the following standards:

- (a) ***Code 39.***
- (b) ***Medium to high density, high density preferred.***
- (c) ***1.0" high barcode.***

- (d) Human readable interpretation (HRI) 0.50" high printed below the barcode.**
- (e) Spacing between barcode and HRI will be 0.10".**
- (f) Minimum left and right margin (quiet zones) will be at least 0.25".**
- (g) All barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number, and waste stream identification number.**
- (h) A total of two barcode labels shall be placed on each box or nonstandard package near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top.**
- (i) A sample barcode must be submitted to REECo/WMD prior to the first shipment to ensure that REECo/WMD equipment can be used to read the barcode. (NVO-325 [Rev. 1], Section 5.5.1.3.J)**

WIPP Requirements:

The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.

Compliance Method: LLNL barcoding will comply with DOE/NV requirements and meet the following requirements:

- (a) Code 39.**
- (b) Medium density.**
- (c) Barcode will be 1.0" high.**
- (d) Human readable interpretation 0.50" high will be printed below the barcode.**
- (e) Spacing between barcodes and HRI will be 0.10".**
- (f) Left and right margins will be at least 0.25".**
- (g) Barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number; and waste stream identification number.**

- (h) A total of two barcode labels shall be placed on each TRUPACT-II Standard Waste Box near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top. Each box and drum will also have LLNL's WIPP-required barcode labels. These are of the form "LL85n nnnnnTRU", where each n is a single-digit number. For each drum, one of these TRU barcode labels will be placed on the top of the drum lid and three on the side near the bottom. For each box, one TRU barcode label will be placed on the top and one on each of the four sides. Procedures for applying TRU barcodes are found in HWM 202. Procedures for applying the NTS-required barcode labels will be documented in a revision of HWM Procedure 204.
- (i) A sample barcode will be submitted to REEC Co prior to the first shipment.

(11) Onsite Transfer

NTS Requirements:

Onsite transfer must be in accordance with NV 54XG.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpackaged bulk material having external contamination, that contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325 [Rev. 1], Section 5.5.1.3.K)

WIPP Requirements - None

Compliance Method: Not applicable.

d. Additional Criteria For Mixed Waste

NTS Requirements:

In addition to meeting all of the TRU WAC, mixed waste offered for disposal at the Area 5 RWMS Mixed Waste Management Unit (MWMU) must meet the criteria described in NVO-325 (Rev. 1), Section 5.5.2.

Compliance Method: Not applicable as mixed TRU waste will not be sent to the NTS.

e. Additional Criteria For Transuranic/Transuranic Mixed Waste

NTS Requirements:

Requests for storage of all TRU waste will be considered on a case-by-case basis only. (NVO-325 [Rev. 1], Section 5.5.3)

Compliance Method: LLNL is requesting to ship nonmixed TRU waste to the NTS for interim storage until such time that it can be disposed at the WIPP facility.

f. Additional Criteria For Bulk Waste

NTS Requirements:

Bulk waste is waste which is disposed of in Area 3. It generally exists in a form not suited to the conventional packaging requirements of Area 5. In addition to meeting the TRU WAC, bulk TRU waste must meet the requirements of Title 49 CFR 173.425(c). Nevada Test Site-generated bulk waste must be transported in accordance with NV 54XG.1A and applicable DOT requirements. Bulk containers must be approved by DOE/NV. (NVO-325 [Rev. 1], Section 5.5.4) -

Compliance Method: Not applicable as bulk nonmixed TRU waste will not be shipped to the NTS.

g. Additional Criteria for Case-by-Case Waste

NTS Requirements:

In addition to meeting LLW WAC, the following case-by-case waste types offered for disposal at the NTS must meet the criteria described below. (NVO-325 [Rev. 1], Section 5.5.5)

WIPP Requirements - None

- (1) **Weight:** (NVO-325 [Rev. 1], Section 5.5.5.1) - See Section III.A.5.c(5), "Weight."
- (2) **Activity Limits:** (NVO-325 [Rev. 1], Section 5.5.5.2) - See Section III.A.5.b(6), "Activity Limits."
- (3) **Radioactively Contaminated Asbestos:** (NVO-325 [Rev. 1], Section 5.5.5.3)

Compliance Method: Nonmixed TRU waste containing regulated asbestos will not be shipped to the NTS.

- (4) **DOE Comparable Greater than Class C: (NVO-325 [Rev. 1], Section 5.5.5.4)**

Compliance Method: LLNL nonmixed TRU waste may be greater than Class C. LLNL nonmixed TRU waste is not being offered for disposal, but rather for interim storage.

- (5) **Classified Waste Streams: (NVO-325 [Rev. 1], Section 5.5.5.5) -**
Not applicable.

- (6) **Radioactive Animal Carcasses: (NVO-325 [Rev. 1], Section 5.5.5.6) -** Not applicable.

- (7) **Other Waste Forms: (NVO-325 [Rev. 1], Section 5.5.5.7) -** Not applicable.

h. Additional TRU Requirements for WIPP:

- (1) **New Mexico Environmental Department Requirements:**

The NMED has the authority to promulgate additional requirements for the management of TRU mixed waste and to issue site-specific permit conditions during the RCRA permitting process. The NMED has not yet stipulated additional requirements for the mixed waste program. Future requirements, as applicable to the WIPP WAC, will be incorporated into this document as they become known. (DOE/WIPP-069 [Rev. 4], Section 3.6.1.3)

Compliance Method: Not applicable as LLNL will not ship TRU mixed waste to the NTS for interim storage at this time.

6. Waste Stream Characterization Data Sheet: (NVO-325 [Rev. 1], Section 5.6)

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: BCLA-TRU000003
2. Waste Description: This waste stream consists of contaminated material such as decommissioned glove boxes, hoods, and large pieces of contaminated equipment (lathes, mills, etc.).
 - a. Physical Characteristics: Waste stream is solid.
 - b. Special Handling/Disposal Requirements: None required.
3. Basis for Characterization:
 - a. Process Knowledge: X
 - b. Analytical Knowledge:
 - c. Both:

(If B or C, provide Standardized Data Reporting Forms as necessary.)
4. Radioactive Characteristics:
 - a. Is Waste > NRC Class C (See Title 10 CFR 61.55)? Yes
 - b. WMIS Nuclide Category (circle) ① 2 3 4 5 NA 7 8

(Choose the highest predominant nuclide. The number 6 is not an option.)

- c. Radioactive Constituents:

Specific Activity Range of Waste Streams

	Nuclide	Chemical Forms	Minimum	Mean	Maximum	Units
1	Am-241	metal oxide	0.	3.46E-03	3.32E-01	Ci/kg
2	Am-242m	metal oxide	0.	6.84E-06	2.29E-02	Ci/kg
3	Am-243	metal oxide	0.	6.87E-07	1.02E-03	Ci/kg
4	Cf-249	metal oxide	0.	7.23E-09	1.59E-05	Ci/kg
5	Cm-244	metal oxide	0.	2.53E-03	2.73E+00	Ci/kg
6	Cm-246	metal oxide	0.	1.80E-08	8.55E-06	Ci/kg
7	Cs-137	metal oxide	0.	6.63E-11	1.58E-08	Ci/kg
8	Eu-152	metal oxide	0.	4.66E-11	1.11E-08	Ci/kg
9	Eu-154	metal oxide	0.	1.76E-11	4.19E-09	Ci/kg
10	Np-237	metal oxide	0.	8.59E-09	1.39E-05	Ci/kg
11	Pu-238	metal oxide	0.	1.84E-03	3.83E-01	Ci/kg
12	Pu-239	metal oxide	0.	3.98E-03	7.19E-02	Ci/kg
13	Pu-240	metal oxide	0.	1.68E-03	3.80E-02	Ci/kg
14	Pu-241	metal oxide	0.	5.16E-02	1.16E+00	Ci/kg
15	Pu-242	metal oxide	0.	5.43E-07	2.60E-05	Ci/kg
16	Sb-125	metal oxide	0.	5.29E-12	1.26E-09	Ci/kg
17	Th-228	metal oxide	0.	1.06E-12	2.53E-10	Ci/kg
18	U-235	metal oxide	0.	7.23E-11	7.11E-08	Ci/kg
19	U-238	metal oxide	0.	9.85E-09	5.03E-06	Ci/kg

Figure 11. Waste Stream Characterization Data Sheet - BCLA-TRU000003 - Page 1

WASTE STREAM CHARACTERIZATION DATA SHEET (continued)

5. Hazardous Components (for mixed waste): Not Applicable
 - a. Basis for Identifying as mixed waste : Not Applicable
 - b. List the applicable EPA waste code, the chemical name, the treatment performed (if applicable) and the regulatory/treatment standard. Attach Standardized Data Reporting Forms. Not Applicable

7. Waste Forecasting: (Three-Year Waste Shipment Forecast) (NVO-325
[Rev. 1], Section 5.7)

THREE-YEAR WASTE SHIPMENT FORECAST							
GENERATOR: LLNL			PREPARED BY: KEM HAINEBACH DATE: 11/30/93				
FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME (m³)
			TYPE	SIZE	NO. OF CONTAINERS		
FY 1994 10/1 - 12/31					0	0	
1/1 - 3/31					0	0	
4/1 - 6/30					0	0	
7/1 - 9/30					0	0	
FY 1995	BCLA-TRU000003	TRU	STANDARD WASTE BOX	1.9 m³	2	1	3.8
FY 1996	BCLA-TRU000003	TRU	STANDARD WASTE BOX	1.9 m³	1	1	1.9

REMARKS NEXT UPDATES DUE 2/15/94 AND 8/15/94

Figure 12. Three-Year Waste Shipment Forecast - BCLA TRU000003

2

of

2

8. Packaging and Shipping Information:

Include the DOT proper shipping name, hazard class, and hazard identification number. (NVO-325 [Rev. 1], Section 5.8)

Compliance Method: TRU shipments will be classed as follows (HWM Procedure 204):

- Department of Transportation Shipping Name - Radioactive Material N.O.S.
- Hazard Class - Radioactive Material
- Hazard Identification Number UN 2982

9. Waste Security Information:

Provide information regarding any special security requirements. (NVO-325 [Rev. 1], Section 5.9)

Compliance Method: No security requirements are necessary for Waste Stream BCLA-TRU0000003.

D. ISAM Program Salt Block Waste

1. Waste Stream Identification Number: BCLA-TRU0000004
2. Waste Type: Nonmixed Transuranic
3. Waste Stream Description: This waste stream consists of pyrochemical salts that requires no further treatment:
 - a. CaCl_2 -CaF salt blocks from the Isotope Separation and Advanced Manufacturing (ISAM) process which contains some Ca metal*, trace Pu (generally less than 1.0 gram) and CaO.
 - b. CaCl_2 -KCl salt blocks from the SIS process which contains some Ca metal* and trace Pu (generally less than 1.0 gram).

This waste stream is free of liquids, sludges, compressed gases, pyrophoric material and explosives. The representation is based upon process control, visual examination, process knowledge, and research of a study completed at INEL on like salt waste forms from the Rocky Flats Plant. Substrate for this waste form is predominately inorganic with less than 10% by weight of nonregulated metallic components, although individual containers may vary considerably from this average.

*Ca metals are not regulated by the state of California.

4. Waste Certification Flow Diagram: See Figure 13
5. Waste Acceptance Criteria:
 - a. General Waste Form Criteria

(1) Transuranics

NTS Requirements:

Requests for interim storage of all TRU waste will be considered on a case-by-case basis.

TRU waste must meet all the NVO-325 (Rev. 1) WAC - including DOE/HQ designation, application to DOE/NV, and participation in the waste generator approval process. TRU waste is only accepted at the NTS for interim storage prior to shipment to the Waste Isolation Pilot Plant. In addition, the generator will be required to provide documentation with their application that the waste is certified to the WIPP WAC, per NVO-325 (Rev. 1), Section 5.5.3.

Waste Stream BCLA-TRU0000004: ISAM Program Salt Block Waste

HWM = Hazardous Waste Management
 GEN = Generator
 LLW = Low-level Waste
 TRU = Transuranic
 TRUW = Transuranic Waste
 WCE = Waste Certification Engineer
 WCC = Waste Container Custodian
 WCO = Waste Certification Official

Figure 13. Waste Certification Flow Diagram - BCLA-TRU0000004

WIPP Requirements For Contact-Handled Waste:

For purposes of TRU waste certification, the lower limit of >100 nanocuries/gram (nCi/g) of TRU radionuclides in the waste shall be interpreted as >100 nCi per gram of waste matrix. The weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and Ra-226) (DOE/WIPP-069 [Rev. 4], Section 3.3.6.1).

Compliance Method: The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. The determination of nuclide concentrations is performed in accordance with either the Building 251 or the Building 332 Procedures.

(2) Hazardous Waste Components

NTS Requirements:

TRU offered for disposal at NTS waste management sites shall not exhibit any characteristics of, or be listed as, hazardous waste as identified in Title 40 CFR 261, "Identification and Listing of Hazardous Waste" or California Code of Regulation, Title 22, Division 4.5, Chapter 11, Section 66261. (NVO-325 [Rev. 1], Section 5.5.1.1.B)

WIPP Requirements For Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with Transuranics. Waste packages containing hazardous waste shall be identified with the appropriate DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D (DOE/WIPP-069 [Rev. 4], Section 3.3.5.1.)

Aqueous materials which have a pH less than 2.0 or greater than 12.5 are prohibited per 40 CFR 261.22(a)(1) . (DOE/WIPP-069 [Rev. 4], Section 3.3.5.2)

Compliance Method: Nonmixed Transuranic wastes for interim storage at NTS will not contain listed hazardous waste or exhibit hazardous waste characteristics as defined in 40 CFR 261 and CCR Title 22, Division 4.5, Chapter 11, Section 66261. The Building 251 and 332 Procedures document administrative and physical controls of materials utilized in each facility to achieve

compliance with this requirement. Personnel responsible for identifying, characterizing, and certifying TRU waste shall receive training on the Federal and State of California characteristic and listed hazardous wastes.

(3) Free Liquids

NTS Requirements:

Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions. LLW disposed at the NTS waste management sites shall contain as little free liquids as is reasonably achievable, but in no case shall the liquid equal or exceed 0.5 percent by volume of the external waste container (NVO-325 [Rev. 1], Section 5.5.1.1.C).

WIPP Requirements For Contact-Handled Waste:

Liquid waste will not be emplaced in the WIPP. TRU waste for emplacement in the WIPP shall contain as little residual liquid as is reasonable achievable. All internal containers (e.g., bottles, cans, etc.) must be well-drained, but may contain residual liquids. As a guideline, residual liquid in well-drained containers will be restricted to approximately one percent of the volume of the internal container. In no case shall the total liquid equal or exceed one volume percent of the waste container (e.g., drum or standard waste box [SWB]). (DOE/WIPP-069 [Rev. 4], Section 3.3.2.1).

Waste for shipment in TRUPACT-II shall contain less than one volume percent of the waste container as liquids (DOE/WIPP-069 [Rev. 4], Section 3.3.2.2)

Compliance Methods: The WIPP requirement of not more than 1.0% free liquids by volume shall be met. This waste is not offered for disposal at the NTS, but rather for storage and eventual shipment to the WIPP for disposal. Therefore, the NVO-325 (Rev. 1) requirement for 0.5% free liquid by volume is not applicable to this waste. Verification of free liquid content will be provided through RTR.

(4) Particulates

NTS Requirements:

Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent of less-than-ten-micrometer-diameter particles, or 15 weight percent of less-than-200-micrometer-diameter particles. Waste that is known to be in a particulate form or in a form that could mechanically or

chemically be transformed to a particulate during handling and interim storage shall be immobilized. When immobilization is impractical, other acceptable waste packaging shall be used, such as the following:

- *Overpacking (i.e., 55-gallon drum inside 83- or 85-gallon drum);*
- *steel box with no liner;*
- *wooden box with a minimum of 6-mil sealed plastic liner;*
- *steel drum with a minimum of 6-mil sealed plastic liner. (NVO-325 [Rev. 1], Section 5.5.1.1.D)*

WIPP Requirements For Contact-Handled Waste Immobilization:

Powders, ashes, and similar particulate waste materials shall be immobilized if more than one weight percent of the waste matrix in each package is in the form of particles below ten microns in diameter, or if more than 15 weight percent is in the form of particles below 200 microns in diameter. (DOE/WIPP-069 [Rev. 4], Section 3.3.1.1)

Compliance Method: Nonmixed Transuranic waste is evaluated by process knowledge or segregated and evaluated for particulates in accordance with the Building 332/251 procedures. Fine particulates are not anticipated in this waste stream.

(5) Gases

NTS Requirements:

Transuranic waste gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 1.5 atmospheres at 20°C. Compressed gases as defined by Title 49 CFR 173.300, including unpunctured aerosol cans, will not be accepted for storage or disposal. Aerosol cans will have puncture disfigurements recognizable by Real-Time Radiography (RTR). Expanded gas cylinders must have the valve mechanism removed. (NVO-325 [Rev. 1], Section 5.5.1.1.E)

WIPP Requirements For Contact-Handled Waste Explosives and Compressed Gases:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases (WIPP/DOE-069 (Rev. 4), Section 3.3.4.1)

Waste containers with waste that could potentially generate gases shall be vented. (DOE/WIPP-069 [Rev. 4], Section 3.4.7.1)

Compliance Method: Compressed gas as defined by Title 49 CFR 173.300, including unpunctured aerosol cans, will not be disposed in TRU containers. Compressed gases and intact aerosol cans will be segregated. Nonhazardous aerosol cans will be punctured and placed into TRU waste containers in accordance with the Building 332/251 procedures.

LLNL will utilize the WIPP-required carbon composite filters on all nonmixed TRU waste packages.

Headspace gas sampling will be performed to statistically assure hydrogen gas does not exceed required limits.

(6) Stabilization

NTS Requirements:

Where practical, waste shall be treated to reduce volume, promote waste minimization and provide a more structurally and chemically stable waste form. (NVO-325 [Rev. 1], Section 5.5.1.1.F)

WIPP Requirements - None

Compliance Method: Nonmixed Transuranic waste from Buildings 332 and 251 consists primarily of solid materials contaminated with radionuclides and is an inherently stable waste form. Procedures governing stabilization and control measures are performed in accordance with NVO-325 (Rev. 1) as defined in the Building 332/251 procedure.

(7) Etiologic Agents

NTS Requirements:

Transuranic waste containing pathogens, infectious wastes, or other etiologic agents as defined in Title 49 CFR 173.386 will not be accepted for disposal at NTS. (NVO-325 [Rev. 1], Section 5.5.1.1.G)

WIPP Requirements - None

Compliance Method: By process knowledge and administrative controls, etiologic agents are not allowed into Buildings 332 and 251; therefore, there is no potential that etiologic waste could be

placed into the TRU waste containers. Control measures are defined in the Building 332/251 procedures.

(8) Chelating Agents

NTS Requirements:

Transuranic waste containing chelating or complexing agents at concentrations greater than one percent by weight of the waste form will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.H)

WIPP Requirements - None

Compliance Method: As determined by process knowledge and administrative controls, chelating and complexing agents in concentrations greater than one percent by weight are not present in Building 332/251. If chelating agents are suspected to be present, TRU waste will be segregated for further analysis. Control measures are defined in the Building 332/251 procedures.

(9) Polychlorinated Biphenyls (PCBs)

NTS Requirements:

PCB-contaminated TRU waste will not be accepted for disposal at the NTS unless the PCB concentration meets municipal solid waste disposal levels of 50 ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325 [Rev. 1], Section 5.5.1.1.I)

WIPP Requirements - None

Compliance Method: Inventory controls shall be used to assure that PCBs are at levels that may be managed as municipal solid waste by both State of California and Federal standards (5 ppm and 50 ppm, respectively).

(10) Explosives and Pyrophorics

NTS Requirements:

Transuranic waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust if the container is breached, will not be accepted. (NVO-325 [Rev. 1], Section 5.5.1.1.J)

WIPP Requirements For Explosives and Compressed Gases in Contact-Handled Waste:

Transuranic waste shall contain no explosives or compressed gases. 49 CFR Part 173 Subpart C defines explosives and 49 CFR Part 173 Subpart G defines compressed gases. (DOE/WIPP-069 [Rev. 4], Section 3.3.4.1)

WIPP Requirement For Pyrophoric Materials in Contact-Handled Wastes:

Pyrophoric materials, other than radionuclides, shall be rendered safe by mixing them with chemically stable materials (e.g., concrete, glass) or shall be processed to remove their hazardous properties. Not more than one percent by weight of the waste in each waste container may be pyrophoric forms of radionuclides, and these shall be generally dispersed in the waste. (DOE/WIPP-069 [Rev. 4], Section 3.3.3.1)

Compliance Method: Plutonium fines are diffused throughout the waste matrix. Nonradioactive fines are solidified if pyrophoric. Nonmixed TRU waste containing explosive and/or pyrophoric material in a form that may spontaneously explode or combust will not be shipped to the NTS for storage.

b. General Regulatory Waste Package Criteria

(1) Design

NTS Requirements:

Type A packaging shall be designed to meet Title 49 CFR 173.411, "General Design Requirements," and Title 49 CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOE Type A Package Certification Program (see MLM-3245, "DOT 7A Type A Certification Document," or succeeding DOE publication). Type B packaging must meet the applicable requirements of Title 10 CFR 71. Strong, tight packaging used for shipping limited quantities and low specific activity TRU waste excepted by Titles 49 CFR 173.421 and 173.425, respectively, must be constructed so that it will not leak during normal transportation and handling conditions. (NVO-325 [Rev. 1], Section 5.5.1.2.A)

WIPP Requirements For Waste Containers in Contact-Handled Waste:

Waste containers for emplacement in the WIPP shall be noncombustible and meet all applicable requirements of 49 CFR

173.412 for Type A packaging. Waste containers of various sizes, shown to meet Department of Transportation (DOT) Type A requirements by methods detailed in MLM-3245 shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/ WIPP-069 (Rev. 4), Section 3.2.1.1)

Standard 55-gallon (208-liter) metal drums, TRUPACT-II Standard Waste Boxes (SWBs), 55-gallon drums overpacked in a SWB, and an experimental bin overpacked in a SWB are authorized for shipment of contact-handled TRU (CH-TRU) waste in TRUPACT-II. (DOE/WIPP-069 [Rev. 4], Section 3.2.1.2)

Compliance Method: LLNL Type A containers shall be designed to comply with 49 CFR 173.411, "General Design Requirements," 49 CFR 173.412, "Additional Design Requirements for Type A packages," and 49 CFR 173.474, "Quality Control for Construction of Packaging." All LLNL TRU waste containers will meet the WIPP/WAC and NVO-325 requirements. All waste packages will be acceptable in TRUPACT-II or other WIPP approved transportation method.

(2) Nuclear Safety

NTS Requirements:

The quantity of fissile radioactive materials shall be limited so that an infinite array of such packages will remain subcritical. This quantity shall be determined on the basis of a specific nuclear safety analysis, considering credible accident situations, and taking into account the actual materials in the waste. See Title 49 CFR 173.451, "Fissile Materials - General Requirements." (NVO-325 [Rev. 1], Section 5.5.1.2.B)

WIPP Requirements For Nuclear Criticality in Contact-Handled Waste:

The fissile or fissionable radionuclide content of CH-TRU waste packages shall be no greater than the following values, in Pu-239 fissile-gram equivalent (FGE): 200 grams per 55-gallon drum (1.21 m³); less than 325 grams for a standard waste box.

The Pu-239 FGE shall be calculated using the methods detailed in Appendix 1.3.7 of the TRUPACT-II Safety Analysis Report For Packaging (SARP). (DOE/WIPP-069 [Rev. 4], Section 3.4.2.1)

TRUPACT-II Requirements for Packaging:

The fissile or fissionable radionuclide content of CH-TRU waste in the TRUPACT-II, including two times the measurement error, shall be less than 200 grams for a 55-gallon drum or less than 325 grams for a SWB. The sum of the fissile equivalents of all waste packages in the entire payload quantity (including two times the error) may not exceed 325 grams. See the calculational methods detailed in Appendix 1.3.7 of the TRUPACT-II SARP for details. (DOE/WIPP-069 [Rev. 4], Section 3.4.2.2)

Compliance Method: Levels of TRU nuclides associated with this waste stream are such that the waste is not considered fissile material. In any event, the material shall be limited so that an infinite array of such packages will remain subcritical. The waste meets the requirements of Title 49 CFR 173.451, "Fissile Material - General Requirements." Control measures are defined in Building 612 Facility Safety Procedure.

The PU-239 FGE will be calculated as required in Appendix 1.3.7 of the TRUPACT-II SARP.

(3) Nuclear Heating

NTS Requirements:

The quantity of radioactive materials shall be limited for each waste matrix and package type so that the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity. See Title 49 CFR 173.442, "Thermal Limitations," for temperature limits. (NVO-325 [Rev. 1], Section 5.5.1.2.C)

WIPP Requirements For Thermal Heating in Contact-Handled Waste:

Individual CH-TRU waste packages in which the average thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) shall have the thermal power recorded in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.6.1)

Compliance Method: Levels of radionuclides associated with this waste stream are limited; therefore, the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or the integrity of the package.

Individual CH-TRU waste packages in which the thermal power density exceeds 0.1 watt/ft³ (3.5 watt/m³) will have the thermal power recorded on the data package.

LLNL calculates the thermal power of each waste package and compares it to the allowed values for the package's TRUCON shipping category. If the allowed value is exceeded, the package will not be certified for shipment in TRUPACT -II.

(4) Radiation Levels

NTS Requirement:

The external radiation levels for packages shall not exceed 200 mrem/hr on contact during handling, shipment, and disposal unless specifically excepted by DOT regulations. See Title 49 CFR 173.441, "Radiation Level Limitations." Type B containers that will be unloaded by remote procedures will be addressed on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.2.D)

WIPP Requirement for Surface Dose Rate and TRUPACT-II Requirements:

Waste Packages shall have a maximum surface dose rate at any point no greater than 200 mrem/hr. Neutron contributions of greater than 20 mrem/hr. to the total waste package dose rate shall be reported separately in the data package. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.1.

The external dose rates on the loaded TRUPACT-II placed on the trailer are limited to 200 mrem/hr at the surface of the TRUPACT-II and 10 mrem/hr at two meters. Dose rates on the TRUPACT-II must comply with 10 CFR 71.47. Drums or SWBs shall not exceed the 200 mrem/hr surface reading or 10 mrem/hr at two meters. Shielded waste containers are allowed for As Low As Reasonably Achievable (ALARA) purposes only and must comply with Section 12.0 of Appendix 1.3.7 of the TRUPACT-II SARP. (DOE/WIPP-069 [Rev. 4], Section 3.4.4.2)

Compliance Method: Packages will be surveyed externally for radiation levels in accordance with 49 CFR 173.441. External radiation levels for containers shall not exceed 200 mrem/hr on contact and 10 mrem/hr at two meters. Neutron contributions of greater than 20 mrem/hr to the total waste package dose rate will be recorded separately in data package. Drums or SWBs will not exceed the 200 mrem/hr surface reading. Surface readings will comply with 10 CFR 71.47. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(5) External Contamination

NTS Requirements:

Packages shall be within DOT contamination limits upon receipt at the NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325 [Rev. 1], Section 5.5.1.2.E)

WIPP Requirement for Removable Surface Contamination in Contact-Handled Waste:

Removable surface contamination on waste packages or package assemblies to be emplaced in WIPP shall not be greater than 50 picocuries per 100 cm² for alpha-emitting radionuclides and 450 picocuries per 100 cm² for beta-gamma-emitting radionuclides. Fixation of surface contamination to meet the above criterion is not permitted. (DOE/WIPP-069 [Rev. 4], Section 3.4.5)

Compliance Method: Packages will be surveyed for nonfixed (removable) radioactive contamination on each waste container surface to ensure levels are in accordance with 49 CFR 173.443 and the WIPP/WAC requirements. HWM Procedure 203 (Note: HWM 203 may be divided into several procedures).

(6) Activity Limits

NTS Requirements:

The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type A and Type B Packages," shall be met. Where applicable, the activity limits of Titles 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low Specific Activity Radioactive Materials," shall be met for strong, tight packages. See NVO-325 (Rev. 1), Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325 [Rev. 1], Section 5.5.1.2.F)

WIPP Requirements For Specific Activity and Pu-239 Equivalent Activity in Contact-Handled Waste:

For the purpose of TRU waste certification, the lower limit of greater than 100 nCi/g of TRU radionuclides in the waste shall be interpreted as greater than 100 nCi/g of waste matrix. The weight of added external shielding and the waste containers (including any rigid liners) shall be subtracted prior to performing the nCi/g calculation. This is also applicable to wastes managed as TRU under the provisions of DOE Order 5820.2A (e.g., U-233 and RA-226). Documented evidence shall exist to show that the specific activity of any TRU waste

package is greater than 100 nCi/g of waste and that the activity of RH-TRU waste does not exceed 23 Ci/liter. (DOE/WIPP-069 [Rev. 4], Section 3.3.6)

Waste packages shall not exceed 1000 Ci of Pu-239 equivalent activity (PE-Ci). Documented analyses shall be available to show that each package meets the limit. (DOE/WIPP-069 [Rev. 4], Section 3.4.3)

Compliance Method: The activity limits listed in Title 49 CFR 173.431, "Activity Limits for Type B Packages," shall be met, when applicable. The activity limits for Title 49 CFR 173.421, "Limited Quantities of Radioactive Materials," and 49 CFR 173.425, "Transport Requirements for Low-Specific Activity Radioactive Materials," are not applicable. Waste shall meet the requirements of Title 10 CFR 61. The TRU nuclide concentrations are determined to be greater than 100 nCi/g based on assay by segmented gamma scanner, other gamma counting methods, and/or analytical testing results. LLNL calculates Pu-239 equivalent curies for each waste package and certifies that it does not exceed 1000 PE-Ci. The determination of nuclide concentrations is performed in accordance with the Building 251 and Building 332 Procedures and DOE/WIPP-069 [Rev. 4], Section 3.4.3. Remote handled waste will not be sent to the NTS for interim storage. Activities of the waste will be such that shielding within the waste packages will not be required and all external dose rates will be within the DOT requirements for Type A packaging.

(7) Multiple Hazards

NTS Requirements:

Waste containing multiple hazards shall be packaged according to the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." Currently, the NTS does not accept mixed waste for storage or disposal. (NVO-325 [Rev. 1], Section 5.5.1.2.G)

WIPP Requirements For TRU Mixed Wastes in Contact-Handled Waste:

Transuranic wastes shall contain no hazardous wastes unless they exist as co-contaminants with transuranics. Waste packages containing hazardous waste shall be identified with the appropriate DOT label. All TRU-contaminated corrosive, reactive, and ignitable materials shall be treated to remove the hazardous characteristic. Hazardous wastes to be reported are listed in 40 CFR 261, Subparts C and D. The basis for the identification of the hazardous wastes will be process knowledge supplemented with sampling. (DOE/WIPP-069 [Rev. 4], Section 3.3.5)

Compliance Method: Materials associated with this waste stream are characterized to assure that no multiple hazards exist as described in building-specific Procedures. No TRU waste containing hazardous constituents will be sent to the NTS for storage.

c. NTS Specific Package Criteria

(1) Closure

NTS Requirements:

The package closure shall be sturdy enough that it will not be breached under normal handling conditions and will not serve as a weak point for package failure. (NVO-325 [Rev. 1], Section 5.5.1.3.A)

WIPP Requirement For Waste Containers in Contact-Handled Waste:

Waste containers shall be used, handled, and stored in a manner that is expected to maintain their Type A packaging specification from the time of certification to emplacement in the WIPP. (DOE/WIPP-069 [Rev. 4], Section 3.2.1)

Compliance Method: Each package shall be closed and sealed to prevent leakage during normal handling. Closure will not serve as a weak point for package failure. All waste containers will be handled and stored in a manner that will not compromise its Type A packaging. Building 332/251 procedures, Procedures HWM 203.

(2) Strength

NTS Requirements:

Except for bulk waste, waste packaged in steel drums, or SEALAND® containers, the waste package (packaging and contents) shall be capable of supporting a uniformly distributed load of 19,528 kg/m² (4,000 lb/ft²). This is required to support other waste packages and earth cover without crushing during stacking and covering operations. (NVO-325 [Rev. 1], Section 5.5.1.3.B)

WIPP Requirement - see Closure, above.

Compliance Method: Bulk (nonmixed) TRU waste will not be sent to the NTS for storage. SEALAND® containers will not be used for packaging TRU waste. All nonmixed TRU waste will be packaged in WIPP-acceptable packaging, namely, steel drums or steel TRUPACT-II Standard Waste Boxes or Ten Drum Overpacks. The

LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications.

(3) Handling

NTS Requirements:

All waste packages shall be provided with permanently attached skids, cleats, offsets, rings, handles, or other auxiliary lifting devices to allow handling by means of forklifts, cranes, or similar handling equipment. Lifting rings and other auxiliary lifting devices on the package are permissible, provided they are recessed, offset, or hinged in a manner that does not inhibit stacking the packages. The lifting devices must be designed to a 5:1 safety factor based on the ultimate strength of the material. All rigging devices that are not permanently attached to the waste package must have a current load test based on 125 percent of the safe working load. (NVO-325 [Rev. 1], Section 5.5.1.3.C)

WIPP Requirements:

All waste packages shall be provided with cleats, offsets, chimes (SIC), skids or 7-pack handling fixture for handling by means of fork trucks, cranes, or similar handling devices. Lifting rings and other auxiliary lifting devices on the waste packages, if provided, shall be recessed, offset, or hinged in a manner which does not inhibit stacking the waste packages. (DOE/WIPP-069 [Rev. 4], Section 3.2.3.1)

Compliance Method: Waste packages shall be provided with permanently attached skids, cleats, offsets, chimes, rings, handles, or other auxiliary lifting devices to allow handling by means of a forklift, crane, or similar handling equipment. The LLNL Hazardous Materials Transportation Safety Manual details the responsibilities for container specifications. The LLNL TRU Waste Program Certification and QA Plan specifies certification program responsibilities for TRU waste package specifications.

(4) Size

NTS Requirements:

1.2- x 1.2- x 2.1-m (4- x 4- x 7-ft) or 1.2- x 0.6- x 2.1-m (4- x 2- x 7-ft) (width, height, length) boxes or 208-liter (55-gallon) drums are required to be used. Bulk waste container approval is discussed in NVO-325 (Rev. 1), Section 5.5.4. While these sizes allow optimum stacking efficiency in disposal cells, other dimensions are acceptable with approval from DOE/NV on a case-by-case basis. (NVO-325 [Rev. 1], Section 5.5.1.3.D)

WIPP Requirements:

Contact-handled TRU waste packages or package assemblies shall not exceed 12- x 8- x 8.5-feet (3.7- x 2.4- x 2.6-m) in overall length x width x height dimensions. (DOE/WIPP-069 [Rev. 4], Section 3.2.2.1)

Compliance Method: Only WIPP-approved, TRUPACT-II acceptable packaging will be shipped to the NTS. Container specifications are maintained by the LLNL Supply and Distribution Department (TRU Waste Program Certification and QA Plan).

(5) **Weight**

NTS Requirements:

In addition to the weight limits set for specific packaging designs, NTS imposes limits of 4,082 kg (9,000 pounds) per box and 544 kg (1,200 pounds) per 208-liter (55-gallon) drum. Packages exceeding 4,082 kg (9,000 pounds) require crane or large forklift removal and must be approved by the REECo Waste Operations Department prior to shipment. Shipments of this type must be in a removable-top or removable-side trailer. (NVO-325 [Rev. 1], Section 5.5.1.3.E)

WIPP Requirements:

The following weight limits shall apply for waste package assemblies transported in the TRUPACT-II package:

- ***1,00 lbs per drum***
- ***1,450 lbs per drum overpacked in a SWB***
- ***4,000 lbs per SWB***
- ***7,265 lbs per TRUPACT-II payload***
- ***19,250 lbs per TRUPACT-II payload, including the weight of the TRUPACT-II.***

Recent enhancements in the TRUPACT-II design have resulted in an average payload weight of approximately 6,200 lbs. The total weight of the top seven-pack of drums or SWB including error shall be less than or equal to the total weight including error of the lower seven-pack of drums or SWB. The DOT limit of 80,000 lbs gross vehicle weight (GVW) must also be met.

Compliance Method: Waste packages are weighed per HWM Procedure 203 to assure gross weight does not exceed permissible NTS, WIPP, or TRUPACT-II weight limits.

(6) Loading

NTS Requirements:

Waste packages shall be loaded to ensure that the interior volume is as efficiently and compactly loaded as practical. High-density loading will allow efficient RWMS space utilization and provide a more stable waste form that will reduce subsidence and enhance the long-term performance of the disposal site. (NVO-325 [Rev. 1], Section 5.5.1.3.F)

WIPP Requirements - None

Compliance Method: This requirement is not applicable as nonmixed TRU waste will not be offered for disposal at the NTS. Waste packages shall be loaded as efficiently and completely as possible. HWM Procedure 204 is currently utilized for the loading of the Polyparther Type B shipping cask. This procedure will be revised if loading operations switch to the use of the TRUPACT-II or other Type B shipping casks.

(7) Nonstandard Type A Packaging

NTS Requirements:

Use of DOT Type A packages not previously evaluated under the DOE Type A Package Certification Program (see MLM-3245, etc.) will not be permitted. (NVO-325 [Rev. 1], Section 5.5.1.3.G)

WIPP Requirements - None

Compliance Method: Nonstandard Type A Packaging will not be used for TRU waste disposal. Packaging shall meet NTS and WIPP criteria. Refer to LLNL Hazardous Materials Transportation Safety Manual.

(8) Package Protection

NTS Requirements:

The generator shall take the following precautions to protect the waste package after closure.

- (a) The preshipment storage environment shall be controlled to avoid adverse influence from weather or other factors***

on the containment capability of the waste packaging during handling, storage, and transport. The generator preparing waste for preshipment storage shall take all reasonable precautions to preclude the accumulation of moisture on or in packages prior to their arrival at the NTS.

- (b) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.***
- (c) Each waste package shall be prepared for shipment so as to minimize damage during transit. Minor damage incurred during transit, not attributable to poor packaging, will be repaired at the NTS without charge to the waste generator. Costs for repairs of damage caused by waste generator or carrier negligence, as well as any necessary decontamination to meet DOE Order 5480.11, will be charged to the waste generator. (NVO-325 [Rev. 1], Section 5.5.1.3.H)***

WIPP Requirements - None

Compliance Method: LLNL will prepare its waste shipments to minimize damage during shipment and storage. TIDs will be placed on each container upon completion of certification. TRU Waste Program Certification and QA Plan and Procedures Building 332 FSP, Appendix H, MM-VI-3, and HWM 204.

(9) Marking and Labeling

NTS Requirements:

Each waste package shall have the following information:

- (a) Marking and labeling as required in Title 49 CFR 172, Subparts D and E.***
- (b) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (See Figure 8, page 76 of the NVO-325 (Rev. 1)). If the waste is unpackaged bulk, a signed NV-211 label must accompany the shipment papers. These labels can be obtained from REECo.***
- (c) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REECo (see Appendix D in the NVO-325 (Rev. 1)); one alpha-character for type of waste - M for MW, T for TRU, or X for TRUMW; two numeric characters for current fiscal year; three numeric characters for shipment***

sequence. Example MDL90001 would mean a shipment from EG&G Mound of low-level waste in fiscal year 1990 and the first shipment.

- (d) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.***
- (e) Approved 13-digit waste stream identification number (see Section 5.1 in NVO-325 [Rev. 1]).***
- (f) Package weight in units of pounds and kilograms. (NVO-325 [Rev. 1], Section 5.5.1.3.1)***

WIPP Requirements:

- (g) In addition to DOT labeling requirements, each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.***
- (h) The identification marking must be reasonably expected to remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground. (DOE/WIPP-069 [Rev. 4], Section 3.4.8.1)***
- (i) The shipper shall assign a unique shipment number to each shipment. The shipment number consists of the two-letter shipping site identification code specified in Table B-3, followed by the last two digits of the year of transport to the WIPP, and the next consecutive four digit shipment number for the site. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.3)***
- (j) When the interim storage site (rather than the generating site) packages drums into a package assembly, the interim storage site assigns the package assembly number. (DOE/WIPP-069 [Rev. 4], Appendix B, Section B.3.7)***

Compliance Method:

- (a) All waste packages will be marked and labeled in accordance with 49 CFR 172, Subparts D and E. Procedures HWM 203 and 204.***
- (b) An NV-211, "Packaging Certification" label will be completed and signed by the Waste Certification Official or Waste***

Certification Engineer and affixed to each container. HWM Procedure 204.

- (c) The shipment number shall consist of eight characters. The first two characters will be "L" and "L" (assigned by REEC_o); the third character will be "T" for transuranic waste; the fourth and fifth characters will represent the fiscal year (i.e., 93); and the last three characters will be the shipment number, consecutively numbered from the first shipment by LLNL to the NTS each fiscal year. Example: LLT93001. HWM Procedure 204.
- (d) LLNL will supply a unique six-character number for each package within a shipment.
- (e) The waste stream identification number shall be 13 characters in length. The first four characters will be the DOE-assigned Waste Management Information System (WMIS) generator code and the remaining nine characters are the generator-assigned waste stream code. Example: BCLA-TRU000001.
- (f) The package weight will be marked on the container in both pounds and kilograms in characters at least one-half inch in height. HWM Procedure 203.
- (g) Each waste container shall be uniquely identified by means of a label permanently attached in a conspicuous location. The package identification number shall be at least medium density Code 39 barcode symbology in characters at least one inch high, and alphanumeric characters at least one-half inch high.
- (h) The identification marking will remain legible and affixed to the container for a period of 10 years under anticipated conditions of interim storage before shipment to the WIPP and emplacement underground.
- (i) This requirement is not applicable as NTS is the interim storage site and is required to be the shipper to the WIPP disposal site.
- (j) NTS, as the interim storage site (rather than the generating site), will package the drums into a package assembly, the interim storage site assigns the package assembly number.

(10) Barcoding

NTS Requirements:

The shipment, package, and waste stream identification numbers shall be barcoded according to the following standards:

- (a) Code 39.***
- (b) Medium to high density, high density preferred.***
- (c) 1.0" high barcode.***
- (d) Human readable interpretation (HRI) 0.50" high printed below the barcode.***
- (e) Spacing between barcode and HRI will be 0.10".***
- (f) Minimum left and right margin (quiet zones) will be at least 0.25".***
- (g) All barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number, and waste stream identification number.***
- (h) A total of two barcode labels shall be placed on each box or nonstandard package near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top.***
- (i) A sample barcode must be submitted to REEC_o/WMD prior to the first shipment to ensure that REEC_o/WMD equipment can be used to read the barcode. (NVO-325 [Rev. 1], Section 5.5.1.3.J)***

WIPP Requirements:

The package identification number shall be in medium-to-low density Code 39 barcode symbology per MIL-STD-1189B in characters at least one inch high, and alphanumeric characters at least one-half inch high.

Compliance Method: LLNL barcoding will comply with DOE/NV requirements and meet the following requirements:

- (a) Code 39.***
- (b) Medium density.***

- (c) Barcode will be 1.0" high.
- (d) Human readable interpretation 0.50" high will be printed below the barcode.
- (e) Spacing between barcodes and HRI will be 0.10".
- (f) Left and right margins will be at least 0.25".
- (g) Barcodes and HRI will be stacked with a minimum separation of 0.50" and in the following order: shipment number, container number; and waste stream identification number.
- (h) A total of two barcode labels shall be placed on each TRUPACT-II Standard Waste Box near the top and on opposite sides. Drums will have a total of two barcode labels, one on top of the drum lid and one on the side near the top. Each box and drum will also have LLNL's WIPP-required barcode labels. These are of the form "LL85n nnnnnTRU, where each n is a single-digit number. For each drum, one of these TRU barcode labels will be placed on the top of the drum lid and three on the side near the bottom. For each box, one TRU barcode label will be placed on the top and one on each of the four sides. Procedures for applying TRU barcodes are found in HWM 202. Procedures for applying the NTS-required barcode labels will be documented in a revision of HWM Procedure 204.
- (i) A sample barcode will be submitted to REEC Co prior to the first shipment.

(11) Onsite Transfer

NTS Requirements:

Onsite transfer must be in accordance with NV 54XG.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpackaged bulk material having external contamination, that contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325 [Rev. 1], Section 5.5.1.3.K)

WIPP Requirements - None

Compliance Method: Not applicable.

d. Additional Criteria For Mixed Waste

NTS Requirements:

In addition to meeting all of the TRU WAC, mixed waste offered for disposal at the Area 5 RWMS Mixed Waste Management Unit (MWMU) must meet the criteria described in NVO-325 (Rev. 1), Section 5.5.2.

Compliance Method: Not applicable as mixed TRU waste will not be sent to the NTS.

e. Additional Criteria For Transuranic/Transuranic Mixed Waste

NTS Requirements:

Requests for storage of all TRU waste will be considered on a case-by-case basis only. (NVO-325 [Rev. 1], Section 5.5.3)

Compliance Method: LLNL is requesting to ship nonmixed TRU waste to the NTS for interim storage until such time that it can be disposed at the WIPP facility.

f. Additional Criteria For Bulk Waste

NTS Requirements:

Bulk waste is waste which is disposed of in Area 3. It generally exists in a form not suited to the conventional packaging requirements of Area 5. In addition to meeting the TRU WAC, bulk TRU waste must meet the requirements of Title 49 CFR 173.425(c). Nevada Test Site-generated bulk waste must be transported in accordance with NV 54XG.1A and applicable DOT requirements. Bulk containers must be approved by DOE/NV. (NVO-325 [Rev. 1], Section 5.5.4)

Compliance Method: Not applicable as bulk nonmixed TRU waste will not be shipped to the NTS.

g. Additional Criteria for Case-by-Case Waste

NTS Requirements:

In addition to meeting LLW WAC, the following case-by-case waste types offered for disposal at the NTS must meet the criteria described below. (NVO-325 [Rev. 1], Section 5.5.5)

WIPP Requirements - None

(1) **Weight:** (NVO-325 [Rev. 1], Section 5.5.5.1) - See Section III.A.5.c(5), "Weight."

(2) **Activity Limits:** (NVO-325 [Rev. 1], Section 5.5.5.2) - See Section III.A.5.b(6), "Activity Limits."

(3) **Radioactively Contaminated Asbestos:** (NVO-325 [Rev. 1], Section 5.5.5.3)

Compliance Method: Nonmixed TRU waste containing regulated asbestos will not be shipped to the NTS.

(4) **DOE Comparable Greater than Class C:** (NVO-325 [Rev. 1], Section 5.5.5.4)

Compliance Method: LLNL nonmixed TRU waste may be greater than Class C. LLNL nonmixed TRU waste is not being offered for disposal, but rather for interim storage.

(5) **Classified Waste Streams:** (NVO-325 [Rev. 1], Section 5.5.5.5) - Not applicable.

(6) **Radioactive Animal Carcasses:** (NVO-325 [Rev. 1], Section 5.5.5.6) - Not applicable.

(7) **Other Waste Forms:** (NVO-325 [Rev. 1], Section 5.5.5.7) - Not applicable.

h. Additional TRU Requirements for WIPP:

(1) **New Mexico Environmental Department Requirements:**

The NMED has the authority to promulgate additional requirements for the management of TRU mixed waste and to issue site-specific permit conditions during the RCRA permitting process. The NMED has not yet stipulated additional requirements for the mixed waste program. Future requirements, as applicable to the WIPP WAC, will be incorporated into this document as they become known. (DOE/WIPP-069 [Rev. 4], Section 3.6.1.3)

Compliance Method: Not applicable as LLNL will not ship TRU mixed waste to the NTS for interim storage at this time.

6. Waste Stream Characterization Data Sheet: (NVO-325 [Rev. 1], Section 5.6)

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: BCLA-TRU000004
2. Waste Description: This waste stream consists of $\text{CaCl}_2\text{-CaF}$ and $\text{CaCl}_2\text{-KCl}$ pyrochemical salt blocks from the ISAM process. May contain trace Pu (generally less than 1.0 gram) and CaO .
 - a. Physical Characteristics: Waste stream is solid.
 - b. Special Handling/Disposal Requirements: None required.
3. Basis for Characterization:
 - a. Process Knowledge: X
 - b. Analytical Knowledge:
 - c. Both:

(If B or C, provide Standardized Data Reporting Forms as necessary.)
4. Radioactive Characteristics:
 - a. Is Waste > NRC Class C (See Title 10 CFR 61.55)? Yes
 - b. WMIS Nuclide Category (circle) ① 2 3 4 5 NA 7 8
(Choose the highest predominant nuclide. The number 6 is not an option.)
 - c. Radioactive Constituents:

Specific Activity Range of Waste Stream

	Nuclide	Chemical Forms	Minimum	Mean	Maximum	Units
1	Am-241	metal oxide	0.	3.46E-03	3.32E-01	Ci/kg
2	Am-242m	metal oxide	0.	6.84E-06	2.29E-02	Ci/kg
3	Am-243	metal oxide	0.	6.87E-07	1.02E-03	Ci/kg
4	Cf-249	metal oxide	0.	7.23E-09	1.59E-05	Ci/kg
5	Cm-244	metal oxide	0.	2.53E-03	2.73E+00	Ci/kg
6	Cm-246	metal oxide	0.	1.80E-08	8.55E-06	Ci/kg
7	Cs-137	metal oxide	0.	6.63E-11	1.58E-08	Ci/kg
8	Eu-152	metal oxide	0.	4.66E-11	1.11E-08	Ci/kg
9	Eu-154	metal oxide	0.	1.76E-11	4.19E-09	Ci/kg
10	Np-237	metal oxide	0.	8.59E-09	1.39E-05	Ci/kg
11	Pu-238	metal oxide	0.	1.84E-03	3.83E-01	Ci/kg
12	Pu-239	metal oxide	0.	3.98E-03	7.19E-02	Ci/kg
13	Pu-240	metal oxide	0.	1.68E-03	3.80E-02	Ci/kg
14	Pu-241	metal oxide	0.	5.16E-02	1.16E+00	Ci/kg
15	Pu-242	metal oxide	0.	5.43E-07	2.60E-05	Ci/kg
16	Sb-125	metal oxide	0.	5.29E-12	1.26E-09	Ci/kg
17	Th-228	metal oxide	0.	1.06E-12	2.53E-10	Ci/kg
18	U-235	metal oxide	0.	7.23E-11	7.11E-08	Ci/kg
19	U-238	metal oxide	0.	9.85E-09	5.03E-06	Ci/kg

Figure 14. Waste Stream Characterization Data Sheet - BCLA-TRU0000004 - Page 1

WASTE STREAM CHARACTERIZATION DATA SHEET (continued)

5. Hazardous Components (for mixed waste): Not Applicable
 - a. Basis for Identifying as mixed waste : Not Applicable
 - b. List the applicable EPA waste code, the chemical name, the treatment performed (if applicable) and the regulatory/treatment standard. Attach Standardized Data Reporting Forms. Not Applicable

7. Waste Forecasting: (Three-Year Waste Shipment Forecast) (NVO-325
[Rev. 1], Section 5.7)

THREE-YEAR WASTE SHIPMENT FORECAST							
GENERATOR: LLNL			PREPARED BY: KEM HAINEBACH DATE: 11/30/93				
FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME (m³)
			TYPE	SIZE	NO. OF CONTAINERS		
FY 1994 10/1 - 12/31					0	0	
1/1 - 3/31					0	0	
4/1 - 6/30					0	0	
7/1 - 9/30					0	0	
FY 1995	BCLA-TRU0000004	TRU	METAL DRUM	55 GALLON	2	1	0.416
FY 1996	BCLA-TRU0000004	TRU	METAL DRUM	55 GALLON	2	1	0.416

REMARKS NEXT UPDATES DUE 2/15/94 AND 8/15/94

Figure 15. Three-Year Waste Shipment Forecast - BCLA TRU0000004

8. Packaging and Shipping Information:

Include the DOT proper shipping name, hazard class, and hazard identification number. (NVO-325 [Rev. 1], Section 5.8)

Compliance Method: TRU shipments will be classed as follows (HWM Procedure 204):

- Department of Transportation Shipping Name - Radioactive Material N.O.S.
- Hazard Class - Radioactive Material
- Hazard Identification Number UN 2982

9. Waste Security Information:

Provide information regarding any special security requirements. (NVO-325 [Rev. 1], Section 5.9)

Compliance Method: No security requirements are necessary for Waste Stream BCLA-TRU0000004.

IV. WASTE CERTIFICATION PROGRAM

A. Waste Certification Program

The LLNL TRU Waste Program Certification and Quality Assurance Plan (M-078-121) is provided as a part of this application package as Appendix A.

B. Certification-Related Procedures

Supporting procedures essential to the program are referenced in the LLNL TRU Waste Program Certification and Quality Assurance Plan (M-078-121) and are provided as a part of this application package.

V. EXEMPTION REQUESTS

- Not applicable.

VI. PROCEDURES AND SUPPORTING DOCUMENTS

Procedures and supporting documentation related to the management and certification of these waste streams are provided in the following documents:

- LLNL Waste Minimization Plan, on file at LLNL for review, upon request.
- LLNL TRU Waste Program Certification and Quality Assurance Plan, provided as Appendix A.

A. TRU Waste Procedures

1. TRU-1, Audits
2. TRU-2, Nonconformance Reporting
3. TRU-3, Corrective Action
4. TRU-4, Records Control
5. TRU-5, Document Control
6. TRU-6, TRU Waste Data Collection

B. Hazardous Waste Management Procedures

1. HWM 201, Procurement of TRU Waste Containers
2. HWM 202, TRU Container Inspection and Control
3. HWM 203, TRU Waste Shipment Preparation
4. HWM 204, TRU Shipping Procedure
5. HWM 205, TRU NCRs and Corrections

C. Procedures

1. B332, Facility Safety Procedure
2. B251, Handbook; Facility Safety Procedure (July 1993)
3. B612, Facility Safety Procedure

D. LLNL Hazardous Materials Transportation Safety Manual

VII. REFERENCES

- California Code of Regulations, Title 22, Division 4.5, Chapter 11, Section 66261
- DOE Order 5400.1, "General Environmental Protection Program"
- DOE Order 5400.3, "Hazardous and Radioactive Mixed Waste Program"
- DOE Order 5480.11, "Radiation Protection for Occupational Workers"
- DOE Order 5820.2, "Radioactive Waste Management"
- DOE/WIPP-069 (Rev. 4), "Waste Acceptance Criteria for the Waste Isolation Pilot Plant"
- DOE/WIPP 89-025, (Rev. 1), "Waste Characterization Program Plan for WIPP Experimental Waste"
- LLNL, "Criteria and Procedures for the Certification of Nonradioactive Hazardous Waste", UCRL-AR-109662, latest revision
- MLM-3245, "DOT 7A Type A Certification Document"
- NV-211, "Packaging Certification" Label
- NV 54XG.1A, "NV Radiological Safety Manual"
- NVO-325 (Rev. 1), "Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirements"
- Title 10 CFR 61, "Waste Classification"
- Title 10 CFR 61.55, "Waste Classification"
- Title 10 CFR 71, "Packaging and Transportation of Radioactive Material"
- Title 10 CFR 71.47, "Packaging and Transportation of Radioactive Material"
- Title 40 CFR 261, "Identification and Listing of Hazardous Waste"
- Title 40 CFR 261, Subpart C, "Characteristics of Hazardous Waste"
- Title 40 CFR 261, Subpart D, "Lists of Hazardous Waste"
- Title 40 CFR 261.22(a)(1), "Characteristic of Corrosivity"
- Title 40 CFR 262.20, "Standards Applicable to Generators of Hazardous Waste, General Requirements"
- Title 40 CFR 262.23, "Standards Applicable to Generators of Hazardous Waste, Use of the Manifest"

Title 40 CFR 268, "Land Disposal Restrictions"

Title 40 CFR 761.60, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions, Storage and Disposal, Disposal Requirements"

Title 49 CFR 100.199, "Other Regulations Relating to Transportation: Chapter 1, Research and Special Programs Administration," latest revision

Title 49 CFR 172, Subparts D and E, Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements; Subpart D – Marking; Subpart E – Labeling

Title 49 CFR 173, Subparts C and G, "Classification of Material Having More than One Hazard"

Title 49 CFR 173.2, "Classification of Material Having More than One Hazard"

Title 49 CFR 173.300, "Classification of Material Having More than One Hazard"

Title 49 CFR 173.411, "General Design Requirements"

Title 49 CFR 173.412, "Additional Design Requirements for Type A Packages"

Title 49 CFR 173.421, "Limited Quantities of Radioactive Materials"

Title 49 CFR 173.425, "Limited Quantities of Radioactive Materials"

Title 49 CFR 173.431, "Activity Limits for Type A and Type B Packages"

Title 49 CFR 173.441, "Radiation Level Limitations"

Title 49 CFR 173.442, "Thermal Limitations"

Title 49 CFR 173.443, "Contamination Control"

Title 49 CFR 173.451, "Fissile Materials - General Requirements"

Title 49 CFR 173.474, "Quality Control for Construction of Packaging"

Resource Conservation and Recovery Act (RCRA)

SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
(Third Edition, 1986)

VIII. ACRONYMS

AD	Associate Director
ALARA	As low as reasonably achievable
CFR	Code of Federal Regulations
CH-TRU	Contact-Handled Transuranic Waste
DOE	U.S. Department of Energy
DOE/HQ	U.S. Department of Energy, Headquarters
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DOE/SF	U.S. Department of Energy, San Francisco Operations Office
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FAX	Facsimile
FSP	Facility Safety Procedure
FTS	Federal Telephone System
GVW	Gross Vehicle Weight
HMPTS	Hazardous Materials Packaging and Transportation Safety
HRI	Human Readable Interpretation
HWM	Hazardous Waste Management
kg	kilogram
LDR	Land Disposal Restrictions
LEL	Lower Explosive Limit
LLNL	Lawrence Livermore National Laboratory
MW	Mixed Waste
nCi/g	Nanocuries per Gram
NCR	Nonconformance Report
NMD	No-Migration Determination

NMED	New Mexico Environment Department
NMVP	No-Migration Variance Petition
n.o.s.	Not Otherwise Specified
NRC	U.S. Nuclear Regulatory Commission
NTS	Nevada Test Site
PCBs	Polychlorinated Biphenyls
ppm	parts per million
QA	Quality Assurance
QAPJP	Quality Assurance Project Plan
QAPP	WIPP Quality Assurance Program Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
REEC _o	Reynolds Electrical & Engineering Co., Inc.
RH-TRU	Remote-Handled Transuranic
RTR	Real Time Radiography
RWMS	Radioactive Waste Management Site
SARP	Safety Analysis Report for Packaging
SWB	Standard Waste Box
TID	Tamper Indicating Device
TRAMPAC	TRUPACT-II Authorized Methods for Payload Control
TRU	Transuranic
TRUCON	TRUPACT-II Content Codes Document
TRUPACT-II	Transuranic Package Transporter-II
TRUWCE	Transuranic Waste Certification Engineer
TRUMW	Transuranic Mixed Waste
VOC	Volatile Organic Compound

WAA	Waste Accumulation Area
WAC	Waste Acceptance Criteria
WACCC	Waste Acceptance Criteria Certification Committee
WAP	Waste Analysis Plan
WCE	Waste Certification Engineer
WCO	Waste Certification Official
WIPP	Waste Isolation Pilot Plant
WMD	Waste Management Division
WMIS	Waste Management Information System
WPC	Waste Package Certifier

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END