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LOS ALAMOS NATIONAL LABORATORY
FIELD TEST DIVISION
NEVADA TEST OPERATION

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APPLICATION TO TRANSFER RADIOACTIVE WASTE
TO THE
NEVADA TEST SITE

June 1, 1992

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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 Waste Acceptance Criteria, NVO-325.

Lawrence F. Krenzian
J-DO NTS Resident Test Director

Date

Chuck Costa
Environmental Compliance Officer

Date

Julie A. Carpenter
Waste Certification Official

Date

Allen M. Valentine
Director, Operational Surety Office

Date

Malcom E. Ennis, Jr.
LANL Health Physics Analytical Laboratory

Date

John D. Stewart, Director
Nevada Test Site Office, DOE/NV, Mercury, NV

Date

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PUBLICATION RECORD

ISSUE	DATE	PUBLISHED DOCUMENT		CHANGE	
		APPLICATION	EFFECTIVE	DATE	ENGINEER
1		LANL-NTS Application to Ship Low-Level Waste to the NTS			

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I. GENERATOR INFORMATION

A. Signature Page

The signatures on Page 2 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. EPA Identification Number - Not Applicable.

C. Generator/Facility Name and Location

The waste generator is the Los Alamos Test Group of the Los Alamos National Laboratory, located at the NTS.

D. DOE Field/Area Office Contacts

The DOE Nevada Field Office has oversight responsibility for activities performed at the Nevada Test Site. DOE/NV offices are located on-site at the Nevada Test Site Office (NTSO) and in downtown Las Vegas. John D. Stewart is the Director of the NTSO and D. Curtis Watson is the key contact for waste management operations.

1. John D. Stewart, Director
Nevada Test Site Office
U.S. Department of Energy
Post Office Box 435, M/S 701
Mercury, NV 89023	Commercial: (702) 295-9060
FTS: (702) 295-9060
FAX: (702) 295-6392
2. D. Curtis Watson, Chief
ES&H Operations Branch
Nevada Test Site Office
U.S. Department of Energy
Post Office Box 435, M/S 701
Mercury, NV 89023	Commercial: (702) 295-5755
FTS: (702) 295-5755
FAX: (702) 295-6392

E. Contractor Name and Contact

The LANL-NTS Test Program Organization is shown in Figure 1. Key contact for LANL-NTS low-level radioactive waste management operations is:

1. Julie A. Carpenter
Los Alamos National Laboratory
HS-12 (NTS)
Post Office Box 0
Mercury, NV 89023 | Commercial: (702) 295-7620
FTS: (702) 295-7620
FAX: (702) 295-7378 |
|--|--|

2. Nancy A. Ricca	Commercial: (702) 295-7620
Los Alamos National Laboratory	FTS: (702) 295-7620
HS-12 (NTS)	FAX: (702) 295-7378
Post Office Box 0	
Mercury, NV 89023	

F. Waste Certification Official and Alternate

The LANL Operational Surety Office is depicted in Figure 2. Key contacts for LANL-NTS waste certification operations are:

1. Waste Certification Official

Julie A. Carpenter	Commercial: (702) 295-7620
Los Alamos National Laboratory	FTS: (702) 295-7620
HS-12 (NTS)	FAX: (702) 295-7378
Post Office Box 0	
Mercury, NV 89023	

2. Alternate

Malcolm E. Ennis, Jr.	Commercial: (702) 295-7620
Los Alamos National Laboratory	FTS: (702) 295-7620
HS-12 (NTS)	FAX: (702) 295-7378
Post Office Box 0	
Mercury, NV 89023	

G. Justification for Shipment to the NTS

All waste described in this application has been, and will be, generated by LANL in support of the nuclear weapons test program at the NTS. All waste originates on the NTS. DOE Order 5820.2A states that low-level radioactive waste shall be disposed of at the site where it is generated, when practical. Since the waste is produced at the NTS, it is cost effective for LANL to dispose of the waste at the NTS.

H. Waste Minimization Plan

LANL bases its NTS waste minimization practices on the "Waste Minimization and Pollution Prevention Awareness Plan," (LANL, J-DO) dated February 21, 1992 (Appendix 1).

I. Funding Method

These transfers will be funded annually through a standard REEC Co work order for radioactive waste disposal, based on the annual waste forecast.

FIELD TEST DIVISION J-DIVISION ORGANIZATION TEST PROGRAM ORGANIZATION

Figure 1
Test Program Organization

**NWT Operational Surety Office
Organization Chart
8/20/91**

Figure 2
Operational Surety Office

II. WASTE CHARACTERIZATION PROGRAM

LANL-NTS waste characterization criteria have been developed to comply with established U.S. Environmental Protection Agency (EPA), State of Nevada, and DOE environmental requirements, as well as to ensure compliance with NVO-325. LANL-NTS procedures are documented in the LANL Low-Level Waste Compliance Plan (Appendix 2).

A. Process Knowledge Plan

Waste streams LCAB-000000002, 3, 4, 5, and 6 will be characterized by process knowledge; waste stream LCAB-000000004 is also characterized by in situ gamma spectroscopy. These wastes cannot be sampled because they are too heterogeneous in composition. Available historical information on the activities and contaminants of this material has been assembled and documented in the LANL-NTS Process Knowledge Plan (Appendix 3). Based on historical information and employee interviews, it has been concluded that these waste streams are not suspected to contain any hazardous waste.

A REECO RCRA-qualified person will perform the evaluation of these waste streams and the certified results will be provided to LANL-NTS on REECO Form ? referenced in REECO Standard Operating Procedure ? . This form will then be reviewed by the Waste Certification Official. The form will contain test numbers that shall be traceable to the waste package. If available, documentation will be attached to REECO Form ? that describes the material at fabrication.

B. Sampling Plan

Waste stream LCAB-000000001 will be sampled for hazardous constituents by the REECO Laboratory which has been certified by the ***EPA and/or State of Nevada*** in mm/dd/yy. The procedures for sampling this waste stream is specified in the REECO Sampling and Analysis Plan, in accordance with REECO Standard Operating Procedures.

The sample containers are sealed and labeled to indicate the sample identification number and the time, location, date, and approximate volume of the samples are recorded in the REECO logbook. **LANL-NTS keeps a log of all samples collected by REECO, and the analytical results, in the Waste Container Records and Inventory Tracking System (WCRITS).** For each sample collected a custody record is initiated in the REECO logbook and a REECO Sample Identification Label is affixed to the sample container. All samples are maintained at $4 \pm 2^{\circ}\text{C}$ during transport to the laboratory for analysis. The laboratory acknowledged that the samples were received in good condition (custody seals intact, chilled, and with no breakage) and that holding times had not been exceeded.

A complete inventory of the waste packages is provided in the **WCRITS**.

C. Waste Analysis Requirements

Analytical requirements specified in EPA document SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," (EPA 1986), and other standard references are utilized for sample analysis to determine the presence of RCRA-listed materials or RCRA characteristics. The analyses are performed by the REECo _____ Laboratory in Mercury, Nevada.

Analytical parameters are selected in accordance with the requirements of NVO-325 and the direction of DOE/NV NTS personnel. Analytes and the respective analytical methods used for those analytes are presented in Table 1. Radiological analysis is performed on site by the **LANL HS-12 Health Physics Analytical Laboratory (HPAL)** for determination of radionuclide concentration. The **HPAL** utilizes a **Canberra Genie VAX/EMS spectroscopy** system calibrated to detect and characterize the gamma rays emitted during the decay of radioisotopes or by their associated decay products. The detection limits of this system are indicated in Table 2. The system used for tritium analysis is indicated in Table 3. REECo assesses pure beta and alpha emitters and maintains the information regarding that system.

Contaminants detected in the previously sampled materials were at levels below the TCLP regulatory levels; therefore, they do not constitute a RCRA-hazardous waste based on the toxicity characteristic. There are no PCBs in these waste streams prior to testing; therefore, PCB analysis is not performed. Results from analyses for particle size indicate that these waste streams meet the NTS requirements for particle size. Analysis for free liquids is not performed; any waste with the potential for free liquid accumulation will be packaged in twice the volume of absorbent material or mixed with a nonhazardous gelling/solidifying agent to prevent the accumulation of free liquids.

D. Standardized Reporting Forms

The waste streams requiring analysis were sampled and the analytical results documented in the **WCRITS**. Sampling of these waste streams predated the analytical reporting format protocol provided in NVO-325 (Rev. 1); therefore, the standardized data reporting forms recommended by that document were not used, but will be used for all future reporting of analytical results. The REECo Environmental Compliance Office (ECO) has reviewed the data packages for the analysis of these waste streams. An explanation and discussion of this data validation review, including conclusions and RCRA determination, is contained in the REECo ECO data transmittal letters.

Table 1
Analytical Methods

Parameter	EPA Method*
TCLP-ZHE	1311A
Volatiles	8240A
Semivolatiles	8270A
Metals	6010A for Ba, Cd, Cr, Pb, Ag 7060A for As 7470 for Hg 7740 for Se
Particle Size	ASTM D-422-63

TCLP - Toxicity Characteristic Leaching Procedure

ZHE - Zero Headspace Extraction

*Unless otherwise noted, methods are from SW-846, Third Edition (EPA 1986) including the November 1990 revisions.

Table 2
Canberra Genie VAX/EMS Detection Limits

Table 3
Tritium Analysis System

III. WASTE STREAM INFORMATION

A. Postshot Soil & Drilling Mud

1. Waste Stream Identification Number: LCAB-000000001
2. Waste Type: Low-Level Waste
3. Waste Description: This waste stream consists of radioactive test debris, soil, and drilling mud brought to the surface by the drill rig and tools during core sample collection. These substances are washed off the equipment into a cellar. The cellar is pumped out into a holding tank where it is left to evaporate. Soil is added to solidify the larger waste debris, containerized in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, then sent to the Radioactive Waste Management Facility.

This waste stream also consists of the washings from the core sampling equipment and core sample debris. The cores contain high concentrations of radioactive fission products. The washings contain water used to remove drilling mud and debris from the cores and core shoes. This mixture is solidified with Calseal Cement or Aquaset, containerized in 5- to 55-gallon steel drums, and sent to the Radioactive Waste Management Facility.

Samples of the two mixtures are taken and analyzed for radioactivity at the LANL HPAL in Mercury. TCLP metal analysis will be performed by the REECo _____ Laboratory.

4. Waste Certification Flow Diagram: Figure 3
5. General Waste Form Criteria

- a. *Transuranics: LLW must have a transuranic nuclide concentration less than 100 nCi/g. The mass of the waste container including shielding shall not be used in calculating the specific activity of the waste in accordance with NVO-325, Section 5.5.1.1.A.*

Compliance Method: All transuranic nuclide concentrations are below 100 nanocuries per gram.

- b. *Hazardous Waste Components: LLW 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 in Division 45 Chapter 11. (NVO-325, Section 5.5.1.1.B)*

Compliance Method: This waste stream contains no listed or characteristic hazardous material as identified in 40 CFR 261.

- c. Free Liquids: *Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions (NVO-325, Section 5.5.1.1.C).*

Compliance Method: This waste stream shall be solidified with soil, Aquaset, or Calseal Cement so that the waste package contains no more than 0.5% by volume of free liquids, in accordance with NVO-325, Section 5.5.1.1.C. The Paint Filter Test, EPA SW-846, is not applicable to this waste stream as it is comprised of concrete or a similar substance in its final form.

- d. Particulates: *Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent less-than-ten-micrometer-diameter particles, or 15 weight percent 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 mobilized. (NVO-325, Section 5.5.1.1.D)*

Compliance Method: Fine particulate material shall be immobilized by the methods stated in c., above, and by the use of 6-mil, sealed plastic liners inside of wooden boxes, in accordance with NVO-325, Section 5.5.1.1.D.

- e. Gases: *LLW gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 15 atmosphere 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.*

Compliance Method: This waste stream contains no compressed gases or aerosol cans. There are no gases anticipated to be present as a result of the natural decay of the elements contained in this waste stream.

- f. Stabilization: *Where practical, waste shall be treated to reduce volume, promote waste minimization and provide more structurally and chemically stable waste form. (NVO-325, Section 5.5.1.1.F)*

Compliance Method: This waste stream is solidified material and is chemically stable. The waste will not react with the packaging or contents during storage, shipping, and handling.

- g. *Etiologic Agents*: LLW 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, Section 5.5.1.1.G)

Compliance Method: This waste stream contains no pathogens, infectious wastes, or other etiological agents as defined in 49 CFR 173.386.

- h. *Chelating Agents*: LLW containing chelating or complexing agents at concentrations greater than one percent by weight of waste form will not be accepted (NVO-325, Section 5.5.1.1.H)

Compliance Method: This waste stream contains no chelating or complexing agents.

- i. *Polychlorinated Biphenyls (PCBs)*: PCB contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325, Section 5.5.1.1.I)

Compliance Method: This waste stream does not contain PCBs.

- j. *Explosives and Pyrophorics*: LLW 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, Section 5.5.1.1.J)

Compliance Method: This waste does not contain explosive or pyrophoric material.

6. General Regulatory Waste Package Criteria

- a. *Design*: Type of packaging shall be designed to meet Title 49 CFR 73.411, "General Design Requirements," and Title CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOT 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 packing used for shipping limited quantities and low specific activity LLW 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, Section 5.5.1.2.A)

Compliance Method: The package used is a strong, tight package or DOT-approved steel drums for shipping **LSA, Limited Quantity**, or

radioactive material, as excepted by 49 CFR 173.425 and 173.421, and will not leak during normal transportation and handling.

- b. *Nuclear Safety:* *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 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, Section 5.5.1.2.B)*

Compliance Method: The LLW to be shipped is **LSA, Limited Quantity**, or _____ and type is not fissionable material by quantity. Any amount of this material could be packaged and transported and remain subcritical.

- c. *Nuclear Heating:* *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 of accessible external package surfaces. (NVO-325, Section 5.5.1.2.C)*

Compliance Method: The material to be shipped will be limited so the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity.

- d. *Radiation Levels:* *The external radiation levels for packages shall not exceed 200 millirems per hour 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, Section 5.5.1.2.D)*

Compliance Method: The external package radiation levels shall not exceed 200 millirem/hour on contact unless specifically excepted by DOT regulations. LANL radiation limits meet the requirements set forth in 49 CFR 173.441.

- e. *External Contamination:* *Packages shall be within DOT contamination limits upon receipt at NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325, Section 5.5.1.2.E)*

Compliance Method: Packages shipped on the NTS shall, at a minimum, meet contamination control requirements set forth in 49 CFR 173.443 and DOE Order 5480.11, Attachment 2, levels.

- f. Activity Limits: *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, Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325, Section 5.5.1.2.F)*

Compliance Method: Packages shipped shall not exceed the activity limits for **Limited Quantity** radioactive materials as defined in 49 CFR 173.421 and shall meet transport requirements for **LSA** radioactive materials as defined in 49 CFR 173.425 and NVO-325.

- g. Multiple Hazards: *Waste containing multiple hazards shall be packaged according the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." (NVO-325, Section 5.5.1.2.G)*

Compliance Method: This LLW is defined as a single hazard class (radioactive).

7. NTS Specific Package Criteria

- a. Closure: *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, Section 5.5.1.3.A)*

Compliance Method: Each drum shall be closed and sealed with _____ to prevent leakage during normal handling. Each wooden box shall be closed and sealed with _____ to prevent leakage during normal handling. Closure will not serve as a weak point for package failure.

- b. Strength: *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 lbs/ft²). This is required to support other waste packages and earth cover without crashing during stacking and covering operations. (NVO-325, Section 5.5.1.3.B)*

Compliance Method: Wooden boxes shall be strong, tight containers and shall be documented to meet NVO-325 compressive strength requirements; steel drums are exempt from NTS strength requirements as specified in NVO-325, Section 5.5.1.3.B.

- c. Handling: 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, Section 5.5.1.3.D)

Compliance Method: Wooden boxes shall have permanently attached skids; there are no special handling requirements for drums.

- d. Size: 1.2-x 1.2-x 2.1m(4-x 4-x 7-ft) or 1.2-x 2.1m(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, 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, Section 5.5.1.3.D)

Compliance Method: Waste shall be packaged and shipped in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, or 5- to 55-gallon, DOT-approved or equivalent type drums.

- e. Weight: 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 4,082kg(9,000 pounds) require crane or large forklift removal and must be approved by the REECo Waste Management Department (WMD) prior to shipment. Shipments of this type must be in a removable-side trailer. (NVO-325, Section 5.5.1.3.E)

Compliance Method: The maximum gross weight of any wooden box will not exceed 9,000 pounds; the maximum gross weight of any drum will not exceed 1,200 pounds.

- f. Loading: Waste package 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.

Compliance Method: Waste packages shall be loaded to ensure the interior volume is loaded as efficiently and compactly as possible.

When packaging bulky items, smaller, similarly contaminated items will be added to fill as much void space as possible.

- g. ***Nonstandard Type A Packaging:** 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, Section 5.5.1.3.G)*

Compliance Method: LANL will not be utilizing any nonstandard Type A packaging. Strong, tight containers and 5- to 55-gallon, DOT- approved drums as specified in NVO-325 shall be used.

- h. ***Package Protection:** The generator shall take the following precautions to protect the waste package after closure.*

- (1) *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.*
- (2) *A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.*
- (3) *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 RWMS 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 5840.11 will be charged to the waste generator. (NVO-325, Section 5.5.1.3.H).*

Compliance Method:

- (1) The preshipment storage environment is controlled to prevent adverse effects due to weather and climate. Each waste package shall be prepared so as to minimize damage during transit.
- (2) A _____ Tamper Indicating Device will be applied to each waste container once certification actions have been completed.
- (3) Packages will be properly blocked and braced in the transport vehicle using standard DOT methodology to prevent damage during transport.

i. Marking and Labeling: Each waste package shall have the following information:

- (1) Marking and labeling is required in Title 49 CFR 172, Subparts D and E.
- (2) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (see figure 8, page 84 of the NVO-325). If the waste is unpacked bulk, a signed NV-211 label must accompany the shipment papers. These labels can be obtained from REECO/WMD.
- (3) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REECO/WMD (see Appendix D in the NVO-325); one alpha-character for type of waste - L for LLW, 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.
- (4) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.
- (5) Approved 13-digit waste stream identification number (see Section 5.1 in the NVO-325).
- (6) Package weight in units of pounds and kilograms. (NVO-325, Section 5.5.1.3.I).

Compliance Method:

- (1) Marking and labeling shall be performed as required in Title 49 CFR 172, subparts D and E.
- (2) A signed NV-211, "Packaging Certification," label shall be completed and affixed to each container.
- (3) The shipment number will be marked on the container in characters at least one-half inch in height. The shipment number will be an eight (8) character number: the first two characters will be "L" and "A" (assigned by REECO's Waste Management Department (WMD)); the third character will be "L" for low-level waste; the fourth and fifth characters will represent the fiscal year (i.e., 92); and the last three characters will be the shipment number, consecutively numbered from the first shipment made by LANL to the NTS each fiscal year. Example: LAL92001

- (4) The unique package identification number shall be marked on the container in characters at least one-half inch in height. The package identification number shall be six characters with no duplication within that shipment. Example: S00001
 - (5) Waste Stream Identification Numbers shall be 13 characters in length. The first four characters will be the DOE-assigned WMIS generator code and the remaining nine characters are the generator-assigned waste stream code. Example: LCAB-000000001
 - (6) Package weight in pounds and kilograms will be marked on the container and will be at least one-half inch in height.
- j. *Barcoding: The shipment, package, and waste stream identification numbers shall be barcoded according to the following:*
- (1) *Code 39*
 - (2) *Medium to high density, high density preferred.*
 - (3) *1.0"high barcode.*
 - (4) *Human readable interpretation (HRI) 0.50" high printed below the barcode.*
 - (5) *Spacing between the barcode and HRI will be 0.10".*
 - (6) *Minimum left and right margin (quiet zones) will be*
 - (7) *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.*
 - (8) *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.*
 - (9) *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, Section 5.5.1.3.J)*

Compliance Method: As a low-volume generator (less than 10 shipments per year), barcoding is requested to be provided by REECo WMD as specified in NVO-325, Section 5.5.1.3.J.9. LANL will contact the WMD at least one month in advance to arrange for the

barcodes. Two barcode labels shall be placed on each box, near the top and on opposite sides. Two barcode labels shall be placed on each drum, one on top of the drum lid and one on the side near the top.

- k. On-Site Transfer: Onsite transfer must be in accordance with NV 54Xg.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpacked bulk material having external contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325, Section 5.5.1.3.K)

Compliance Method: Onsite transfer on behalf of LANL will be coordinated with, and performed by, qualified REEC personnel in accordance with NV Order 54XG.1-39, "NV Radiological Safety Manual"; applicable DOT requirements; and any additional requirements as stated in NVO-325.

8. Additional Criteria for Mixed Waste: Not Applicable.
9. Additional Criteria for Transuranic/Transuranic Mixed Waste: Not Applicable.
10. Additional Criteria for Bulk Waste: Not applicable.
11. Additional Criteria for Case-by-Case Waste: Not Applicable.
12. Waste Stream Characterization Data Sheet: Figure 4
13. Three-Year Waste Shipment Forecast: Figure 5
14. Packaging and Shipping Information:
 - a. DOT Proper Shipping Name: Radioactive Material, Low Specific Activity (LSA), n.o.s., Limited Quantity, n.o.s., or _____
 - b. Hazard Class: Radioactive Material
 - c. Hazard Identification Number: UN 2912, UN 2910, or UN _____
 - d. Container Type: Strong, Tight Package or Drums
15. Waste Security Information: None Required

Figure 3
Waste Certification Flow Diagram - LCAB-000000001

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: LCAB-000000001

2. Waste Description:

a. Physical Characteristics: Postshot Soil, Drilling Mud, and Core Washings (solidified)

b. Special Handling/Disposal Requirements: None

3. Basis for Characterization:

a. Process Knowledge: _____

b. Analytical Knowledge: X

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)? No

b. WMIS Nuclide Category (circle): 1 2 3 4 5 NA 7 8
(Choose the highest predominate nuclide. The number 6 is not an option.)

c. Radioactive Constituents:

	Nuclide	Specific Activity Range			(Units)
		Low	Mean	High	
(1)	⁹⁵ Nb	0.01		10	nCi/g
(2)	¹⁰³ Ru	0.01		10	nCi/g
(3)	⁹⁵ Zr	0.01		10	nCi/g
(4)	¹⁴¹ Ce	0.01		10	nCi/g
(5)	¹⁴⁴ Ce	0.01		10	nCi/g

5. Hazardous Components (for mixed waste): NONE

a. Basis for Identifying as Mixed Waste (circle): (1) Ignitable, (2) Reactive, (3) Corrosive, (4) TCLP, (5) Listed 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 Forms. - Not Applicable

Figure 4

Waste Stream Characterization Data Sheet - LCAB-000000001

THREE-YEAR WASTE SHIPMENT FORECAST

GENERATOR	FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME
				TYPE	SIZE	WEIGHT		
	FY 1992	LCAB-0000000001						
	10/01 - 12/31							
	01/01 - 03/31							
	04/01 - 06/30							
	07/01 - 09/30							
	FY 1993							
	FY 1994							

REMARKS

Figure 5
Three-Year Waste Shipment Forecast - LCAB-0000000001

B. Sources

1. Waste Stream Identification Number: LCAB-000000002
2. Waste Type: Low-Level Waste
3. Waste Description: This waste stream consists of various alpha, beta, and gamma instrument check and laboratory calibration sources which are no longer needed. These sources will be decay corrected to current day activity, and reviewed for any hazardous components using the manufacturer's specifications and process knowledge.
4. Waste Certification Flow Diagram: Figure 6
5. General Waste Form Criteria

- a. *Transuranics: LLW must have a transuranic nuclide concentration less than 100 nCi/g. The mass of the waste container including shielding shall not be used in calculating the specific activity of the waste in accordance with NVO-325, Section 5.5.1.1.A)*

Compliance Method: All transuranic nuclide concentrations are below 100 nanocuries per gram.

- b. *Hazardous Waste Components: LLW 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 in Division 45 Chapter 11. (NVO-325, Section 5.5.1.1.B)*

Compliance Method: This waste stream contains no listed or characteristic hazardous material as identified in 40 CFR 261.

- c. *Free Liquids: Free liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions. (NVO-325, Section 5.5.1.1.C)*

Compliance Method: This waste stream is solid and contains no free liquids as defined in NVO-325, Section 5.5.1.1.C; therefore, the Paint Filter Test, EPA SW-846, does not apply.

- d. *Particulates: Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent less-than-ten-micrometer-diameter particles, or 15 weight percent 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 mobilized. (NVO-325, Section 5.5.1.1.D)

Compliance Method: This waste stream contains no particulates as defined in NVO-325, Section 5.5.1.1.D.

- e. Gases: *LLW gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 15 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.*

Compliance Method: This waste stream contains no compressed gases or aerosol cans. There are no gases anticipated to be present as a result of the natural decay of the elements contained in this waste stream.

- f. Stabilization: *Where practical, waste shall be treated to reduce volume, promote waste minimization and provide more structurally and chemically stable waste form. (NVO-325, Section 5.5.1.1.F)*

Compliance Method: This waste stream is solid material and is chemically stable. The waste will not react with the packaging or contents during storage, shipping, and handling.

- g. Etiologic Agents: *LLW 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, Section 5.5.1.1.G)*

Compliance Method: This waste stream contains no pathogens, infectious wastes, or other etiological agents as defined in 49 CFR 173.386.

- h. Chelating Agents: *LLW containing chelating or complexing agents at concentrations greater than one percent by weight of a waste form will not be accepted (NVO-325, Section 5.5.1.1.H)*

Compliance Method: This waste stream contains no chelating or complexing agents.

- i. Polychlorinated Biphenyls (PCBs): *PCB contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325, Section 5.5.1.1.I)*

Compliance Method: This waste stream does not contain PCBs.

- j. Explosives and Pyrophorics: *LLW 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, Section 5.5.1.1.J)*

Compliance Method: This waste does not contain explosive or pyrophoric material.

6. General Regulatory Waste Package Criteria

*** Strong, tight packaging may be used for shipping limited quantities and low specific activity waste only. ***

- a. Design: *Type of packaging shall be designed to meet Title 49 CFR 73.411, "General Design Requirements," and Title CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOT 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 packing used for shipping limited quantities and low specific activity LLW 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, Section 5.5.1.2.A)*

Compliance Method: The package used is a strong, tight package or DOT-approved steel drums for shipping **LSA, Limited Quantity, or** _____ radioactive material, as excepted by 49 CFR 173.425 and 173.421, and will not leak during normal transportation and handling.

- b. Nuclear Safety: *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 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, Section 5.5.1.2.B)*

Compliance Method: The LLW to be shipped is **LSA, Limited Quantity, or** _____ and type is not fissionable material by quantity. Any amount of this material could be packaged and transported and remain subcritical.

- c. Nuclear Heating: *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 of accessible external package surfaces. (NVO-325, Section 5.5.1.2.C)

Compliance Method: The material to be shipped will be limited so the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity.

- d. Radiation Levels: *The external radiation levels for packages shall not exceed 200 millirems per hour 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, Section 5.5.1.2.D)*

Compliance Method: The external package radiation levels shall not exceed 200 millirem/hour on contact unless specifically excepted by DOT regulations. LANL radiation limits meet the requirements set forth in 49 CFR 173.441.

- e. External Contamination: *Packages shall be within DOT contamination limits upon receipt at NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325, Section 5.5.1.2.E)*

Compliance Method: Packages shipped on the NTS shall, at a minimum, meet contamination control requirements set forth in 49 CFR 173.443 and DOE Order 5480.11, Attachment 2, levels.

*** activity limits outside of this range must meet requirements of 10 CFR 61. Material requiring remote handling will incur additional operational costs for the generator ***

- f. Activity Limits: *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, Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325, Section 5.5.1.2.F)*

Compliance Method: Packages shipped shall not exceed the activity limits for Limited Quantity radioactive materials as defined in 49 CFR 173.421 and shall meet transport requirements for LSA radioactive materials as defined in 49 CFR 173.425 and NVO-325.

- g. Multiple Hazards: *Waste containing multiple hazards shall be packaged according the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." (NVO-325, Section 5.5.1.2.G)*

Compliance Method: This LLW is defined as a single hazard class (radioactive).

7. NTS Specific Package Criteria

- a. Closure: *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, Section 5.5.1.3.A)*

Compliance Method: Each drum shall be closed and sealed with _____ to prevent leakage during normal handling. Each wooden box shall be closed and sealed with _____ to prevent leakage during normal handling. Closure will not serve as a weak point for package failure.

- b. Strength: *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 lbs/ft²). This is required to support other waste packages and earth cover without crashing during stacking and covering operations. (NVO-325, Section 5.5.1.3.B)*

Compliance Method: Wooden boxes shall be strong, tight containers and shall be documented to meet NVO-325 compressive strength requirements; steel drums are exempt from NTS strength requirements as specified in NVO-325, Section 5.5.1.3.B.

- c. Handling: *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, Section 5.5.1.3.D)*

Compliance METHOD: Wooden boxes shall have permanently attached skids; there are no special handling requirements for drums.

- d. Size: *1.2-x 1.2-x 2.1m(4-x 4-x 7-ft) or 1.2-x 2.1m(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, 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, Section 5.5.1.3.D)

Compliance Method: Waste shall be packaged and shipped in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, or 5- to 55-gallon, DOT-approved or equivalent type drums.

- e. Weight: *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 4,082kg(9,000 pounds) require crane or large forklift removal and must be approved by the REECO Waste Management Department (WMD) prior to shipment. Shipments of this type must be in a removable-side trailer. (NVO-325, Section 5.5.1.3.E)*

Compliance Method: The maximum gross weight of any wooden box will not exceed 9,000 pounds; the maximum gross weight of any drum will not exceed 1,200 pounds.

- f. Loading: *Waste package 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.*

Compliance Method: Waste packages shall be loaded to ensure the interior volume is loaded as efficiently and compactly as possible. When packaging bulky items, smaller, similarly contaminated items will be added to fill as much void space as possible.

- g. Nonstandard Type A Packaging: *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, Section 5.5.1.3.G)*

Compliance Method: LANL will not be utilizing any nonstandard Type A packaging. Strong, tight containers and 5- to 55-gallon, DOT-approved drums as specified in NVO-325 shall be used.

- h. Package Protection: *The generator shall take the following precautions to protect the waste package after closure.*
- (1) *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.

- (2) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.*
- (3) 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 RWMS 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 5840.11 will be charged to the waste generator. (NVO-325, Section 5.5.1.3.H).*

Compliance Method:

- (1) The preshipment storage environment is controlled to prevent adverse effects due to weather and climate. Each waste package shall be prepared so as to minimize damage during transit.*
 - (2) A _____ Tamper Indicating Device will be applied to each waste container once certification actions have been completed.*
 - (3) Packages will be properly blocked and braced in the transport vehicle using standard DOT methodology to prevent damage during transport.*
- i. Marking and Labeling: Each waste package shall have the following information:*
- (1) Marking and labeling is required in Title 49 CFR 172, Subparts D and E.*
 - (2) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (see figure 8, page 84 of the NVO-325). If the waste is unpacked bulk, a signed NV-211 label must accompany the shipment papers. These labels can be obtained from REEC0/WMD.*
 - (3) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REEC0/WMD (see Appendix D in the NVO-325); one alpha-character for type of waste - L for LLW, 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.

- (4) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.*
- (5) Approved 13-digit waste stream identification number (see Section 5.1 in the NVO-325).*
- (6) Package weight in units of pounds and kilograms. (NVO-325, Section 5.5.1.3.I).*

Compliance Method:

- (1) Marking and labeling shall be performed as required in Title 49 CFR 172, subparts D and E.
 - (2) A-signed NV-211, "Packaging Certification," label shall be completed and affixed to each container.
 - (3) Shipment Number: The shipment number will be marked on the container in characters at least one-half inch in height. The shipment number will be an eight (8) character number: the first two characters will be "L" and "A" (assigned by REEC Co WMD); the third character will be "L" for low-level waste; the fourth and fifth characters will represent the fiscal year (i.e., 92); and the last three characters will be the shipment number, consecutively numbered from the first shipment made by LANL to the NTS each fiscal year. Example: LAL92001
 - (4) Package Number: The unique package identification number shall be marked on the container in characters at least one-half inch in height. The package identification number shall be six characters with no duplication within that shipment. Example: S00001
 - (5) Waste Stream Identification Numbers shall be 13 characters in length. The first four characters will be the DOE-assigned WMIS generator code and the remaining nine characters are the generator-assigned waste stream code. Example: LCAB-000000002
 - (6) Package weight in pounds and kilograms will be marked on the container and will be at least one-half inch in height.
- j. Barcoding: *The shipment, package, and waste stream identification numbers shall be barcoded according to the following:*

- (1) Code 39
- (2) Medium to high density, high density preferred.
- (3) 1.0" high barcode.
- (4) Human readable interpretation (HRI) 0.50" high printed below the barcode.
- (5) Spacing between the barcode and HRI will be 0.10".
- (6) Minimum left and right margin (quiet zones) will be
- (7) 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.
- (8) 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.
- (9) A sample barcode must be submitted to REEC/WMD prior to the first shipment to ensure that REEC/WMD equipment can be used to read the barcode. (NVO-325, Section 5.5.1.3.J)

Compliance Method: As a low-volume generator (less than 10 shipments per year), barcoding is requested to be provided by REEC/WMD as specified in NVO-325, Section 5.5.1.3.J.9. LANL will contact the WMD at least one month in advance to arrange for the barcodes. Two barcode labels shall be placed on each box, near the top and on opposite sides. Two barcode labels shall be placed on each drum, one on top of the drum lid and one on the side near the top.

- k. On-Site Transfer: Onsite transfer must be in accordance with NV 54Xg.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpacked bulk material having external contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325, Section 5.5.1.3.K)

Compliance Method: On-site transfer on behalf of LANL will be coordinated with, and performed by, qualified REEC personnel in accordance with NV Order 54XG.1-39, "NV Radiological Safety Manual"; applicable DOT requirements; and any additional requirements as stated in NVO-325.

8. Additional Criteria for Mixed Waste - Not Applicable.
9. Additional Criteria for Transuranic/Transuranic Mixed Waste - Not Applicable.
10. Additional Criteria for Bulk Waste - Not applicable.
11. Additional Criteria for Case-by-Case Waste - Not Applicable.
12. Waste Stream Characterization Data Sheet: Figure 7
13. Three-Year Waste Shipment Forecast: Figure 8
14. Packaging and Shipping Information:
 - a. DOT Proper Shipping Name: Radioactive Material, Low Specific Activity (LSA), n.o.s., Limited Quantity, n.o.s., or _____
 - b. Hazard Class: Radioactive Material
 - c. Hazard Identification Number: UN 2912, UN 2910, or UN _____
 - d. Container Type: Strong, Tight Package or Drums
15. Waste Security Information: None Required

Figure 6
Waste Certification Flow Diagram - LCAB-000000002

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: LCAB-000000002

2. Waste Description:

a. Physical Characteristics: Calibration Sources

b. Special Handling/Disposal Requirements: None

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)? No

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:

<u>Nuclide</u>	<u>Specific Activity Range</u>			<u>(Units)</u>
	<u>Low</u>	<u>Mean</u>	<u>High</u>	
(1) ¹³⁷ Cs	10 ⁻²		10 ³	μCi/g
(2) ⁶⁰ Co	10 ⁻²		10 ⁴	μCi/g
(3) ⁹⁰ Sr	10 ⁻²		10 ⁴	μCi/g
(4) ²³⁹ Pu	10 ⁻³		< 10 ⁻¹	μCi/g

5. Hazardous Characteristics (for mixed waste): NONE

a. Basis for Identifying as Mixed Waste (circle): (1) Ignitable, (2) Reactive, (3) Corrosive, (4) TCLP, (5) Listed 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 Forms. - Not Applicable

Figure 7

Waste Stream Characterization Data Sheet - LCAB-000000002

THREE-YEAR WASTE SHIPMENT FORECAST

GENERATOR

PREPARED BY

DATE

FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME
			TYPE	SIZE	NO. OF CONTAINERS		
FY 1992	LCAB-000000002						
10/01 - 12/31							
01/01 - 03/31							
04/01 - 06/30							
07/01 - 09/30							
FY 1993							
FY 1994							

REMARKS

Figure 8
Three-Year Waste Shipment Forecast - LCAB-000000002

C. Depleted Uranium

1. Waste Stream Identification Number: LCAB-000000003
2. Waste Type: Low-Level Waste
3. Waste Description: This waste stream consists of solid depleted uranium or solid materials contaminated with depleted uranium.
4. Waste Certification Flow Diagram: Figure 9
5. General Waste Form Criteria

- a. *Transuranics: LLW must have a transuranic nuclide concentration less than 100 nCi/g. The mass of the waste container including shielding shall not be used in calculating the specific activity of the waste in accordance with NVO-325, Section 5.5.1.1.A.*

Compliance Method: All transuranic nuclide concentrations are below 100 nanocuries per gram.

- b. *Hazardous Waste Components: LLW 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 in Division 45 Chapter 11. (NVO-325, Section 5.5.1.1.B)*

Compliance Method: This waste stream contains no listed or characteristic hazardous material as identified in 40 CFR 261.

- c. *Free Liquids: Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions (NVO-325, Section 5.5.1.1.C).*

Compliance Method: This waste stream is solid and contains no free liquids as defined in with NVO-325, Section 5.5.1.1.C. The Paint Filter Test, EPA SW-846, is not applicable.

- d. *Particulates: Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent less-than-ten-micrometer-diameter particles, or 15 weight percent 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 mobilized. (NVO-325, Section 5.5.1.1.D)*

Compliance Method: This waste stream contains no particulates as defined in NVO-325, Section 5.5.1.1.D.

- e. Gases: *LLW gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 15 atmosphere 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.*

Compliance Method: This waste stream contains no compressed gases or aerosol cans. The only gas anticipated to be present is a minor amount of radon from the natural decay of uranium.

- f. Stabilization: *Where practical, waste shall be treated to reduce volume, promote waste minimization and provide more structurally and chemically stable waste form. (NVO-325, Section 5.5.1.1.F)*

Compliance Method: This waste stream is solid material and is chemically stable. The waste will not react with the packaging or contents during storage, shipping, and handling.

- g. Etiologic Agents: *LLW 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, Section 5.5.1.1.G)*

Compliance Method: This waste stream contains no pathogens, infectious wastes, or other etiological agents as defined in 49 CFR 173.386.

- h. Chelating Agents: *LLW containing chelating or complexing agents at concentrations greater than one percent by weight of a waste form will not be accepted (NVO-325, Section 5.5.1.1.H)*

Compliance Method: This waste stream contains no chelating or complexing agents.

- i. Polychlorinated Biphenyls (PCBs): *PCB contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325, Section 5.5.1.1.I)*

Compliance Method: This waste stream does not contain PCBs.

- j. Explosives and Pyrophorics: LLW 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, Section 5.5.1.1.J)

Compliance Methods: This waste does not contain explosive or pyrophoric material.

6. General Regulatory Waste Package Criteria

- a. Design: Type of packaging shall be designed to meet Title 49 CFR 73.411, "General Design Requirements," and Title CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOT 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 packing used for shipping limited quantities and low specific activity LLW 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, Section 5.5.1.2.A)

Compliance Method: The package used is a strong, tight package or DOT-approved steel drums for shipping **LSA, Limited Quantity**, or _____ radioactive material, as excepted by 49 CFR 173.425 and 173.421, and will not leak during normal transportation and handling.

- b. Nuclear Safety: 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 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, Section 5.5.1.2.B)

Compliance Method: The LLW to be shipped is **LSA, Limited Quantity**, or _____ and type is not fissionable material by quantity. Any amount of this material could be packaged and transported and remain subcritical.

- c. Nuclear Heating: 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 of accessible external package surfaces. (NVO-325, Section 5.5.1.2.C)

Compliance Method: The material to be shipped will be limited so the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity.

- d. Radiation Levels: *The external radiation levels for packages shall not exceed 200 millirems per hour 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, Section 5.5.1.2.D)*

Compliance Method: The external package radiation levels shall not exceed 200 millirem/hour on contact unless specifically excepted by DOT regulations. LANL radiation limits meet the requirements set forth in 49 CFR 173.441.

- e. External Contamination: *Packages shall be within DOT contamination limits upon receipt at NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325, Section 5.5.1.2.E)*

Compliance Method: Packages shipped on the NTS shall, at a minimum, meet contamination control requirements set forth in 49 CFR 173.443 and DOE Order 5480.11, Attachment 2, levels.

- f. Activity Limits: *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, Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325, Section 5.5.1.2.F)*

Compliance Method: Packages shipped shall not exceed the activity limits for **Limited Quantity** radioactive materials as defined in 49 CFR 173.421 and shall meet transport requirements for **LSA** radioactive materials as defined in 49 CFR 173.425 and NVO-325.

- g. Multiple Hazards: *Waste containing multiple hazards shall be packaged according the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." (NVO-325, Section 5.5.1.2.G)*

Compliance Method: This LLW is defined as a single hazard class (radioactive).

7. NTS Specific Package Criteria

- a. Closure: 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, Section 5.5.1.3.A)

Compliance Method: Each drum shall be closed and sealed with _____ to prevent leakage during normal handling. Each wooden box shall be closed and sealed with _____ to prevent leakage during normal handling. Closure will not serve as a weak point for package failure.

- b. Strength: 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 lbs/ft²). This is required to support other waste packages and earth cover without crashing during stacking and covering operations. (NVO-325, Section 5.5.1.3.B)

Compliance Method: Wooden boxes shall be strong, tight containers and shall be documented to meet NVO-325 compressive strength requirements; steel drums are exempt from NTS strength requirements as specified in NVO-325, Section 5.5.1.3.B.

- c. Handling: 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, Section 5.5.1.3.D)

Compliance Method: Wooden boxes shall have permanently attached skids; there are no special handling requirements for drums.

- d. Size: 1.2-x 1.2-x 2.1m(4-x 4-x 7-ft) or 1.2-x 2.1m(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, 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, Section 5.5.1.3.D)

Compliance Method: Waste shall be packaged and shipped in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, or 5- to 55-gallon, DOT-approved or equivalent type drums.

- e. Weight: 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 Management Department (WMD) prior to shipment. Shipments of this type must be in a removable-side trailer. (NVO-325, Section 5.5.1.3.E)

Compliance Method: The maximum gross weight of any wooden box will not exceed 9,000 pounds; the maximum gross weight of any drum will not exceed 1,200 pounds.

- f. Loading: Waste package 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.

Compliance Method: Waste packages shall be loaded to ensure the interior volume is loaded as efficiently and compactly as possible. When packaging bulky items, smaller, similarly contaminated items will be added to fill as much void space as possible.

- g. Nonstandard Type A Packaging: 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, Section 5.5.1.3.G)

Compliance Method: Nonstandard Type A Packaging: LANL will not be utilizing any nonstandard Type A packaging. Strong, tight containers and 5- to 55-gallon, DOT-approved drums as specified in NVO-325 shall be used.

- h. Package Protection: The generator shall take the following precautions to protect the waste package after closure.

- (1) 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.

- (2) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.*
- (3) 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 RWMS 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 5840.11 will be charged to the waste generator. (NVO-325, Section 5.5.1.3.H).*

Compliance Method:

- (1) The preshipment storage environment is controlled to prevent adverse effects due to weather and climate. Each waste package shall be prepared so as to minimize damage during transit.*
 - (2) A. _____ Tamper Indicating Device will be applied to each waste container once certification actions have been completed.*
 - (3) Packages will be properly blocked and braced in the transport vehicle using standard DOT methodology to prevent damage during transport.*
- i. **Marking and Labeling:** Each waste package shall have the following information:*
- (1) Marking and labeling is required in Title 49 CFR 172, Subparts D and E.*
 - (2) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (see figure 8, page 84 of the NVO-325). If the waste is unpacked bulk, a signed NV-211 label*
 - (3) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REEC/WMD (see Appendix D in the NVO-325); one alpha-character for type of waste - L for LLW, 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.*
 - (4) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.*

- (5) *Approved 13-digit waste stream identification number (see Section 5.1 in the NVO-325).*
- (6) *Package weight in units of pounds and kilograms. (NVO-325, Section 5.5.1.3.1)*

Compliance Method:

- (1) Marking and labeling shall be performed as required in Title 49 CFR 172, subparts D and E.
- (2) A signed NV-211, "Packaging Certification," label shall be completed and affixed to each container.
- (3) Shipment Number: The shipment number will be marked on the container in characters at least one-half inch in height. The shipment number will be an eight (8) character number: the first two characters will be "L" and "A" (assigned by REEC Co WMD)); the third character will be "L" for low-level waste; the fourth and fifth characters will represent the fiscal year (i.e., 92); and the last three characters will be the shipment number, consecutively numbered from the first shipment made by LANL to the NTS each fiscal year. Example: LAL92001
- (4) Package Number: The unique package identification number shall be marked on the container in characters at least one-half inch in height. The package identification number shall be six characters with no duplication within that shipment. Example: S00001
- (5) Waste Stream Identification Numbers shall be 13 characters in length. The first four characters will be the DOE-assigned WMIS generator code and the remaining nine characters are the generator-assigned waste stream code. Example: LCAB-000000003
- (6) Package weight in pounds and kilograms will be marked on the container and will be at least one-half inch in height.
- j. Barcoding: *The shipment, package, and waste stream identification numbers shall be barcoded according to the following:*
 - (1) *Code 39*
 - (2) *Medium to high density, high density preferred.*
 - (3) *1.0" high barcode.*

- (4) Human readable interpretation (HRI) 0.50" high printed below the barcode.*
- (5) Spacing between the barcode and HRI will be 0.10".*
- (6) Minimum left and right margin (quiet zones) will be*
- (7) 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.*
- (8) 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.*
- (9) 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, Section 5.5.1.3.J)*

Compliance Method: As a low-volume generator (less than 10 shipments per year), barcoding is requested to be provided by REECo WMD as specified in NVO-325, Section 5.5.1.3.J.9. LANL will contact the WMD at least one month in advance to arrange for the barcodes. Two barcode labels shall be placed on each box, near the top and on opposite sides. Two barcode labels shall be placed on each drum, one on top of the drum lid and one on the side near the top.

- k. On-Site Transfer: Onsite transfer must be in accordance with NV 54Xg.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpacked bulk material having external contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325, Section 5.5.1.3.K)*

Compliance Method: On-site transfer on behalf of LANL will be coordinated with, and performed by, qualified REECo personnel in accordance with NV Order 54XG.1-39, "NV Radiological Safety Manual"; applicable DOT requirements; and any additional requirements as stated in NVO-325.

- 8. Additional Criteria for Mixed Waste - Not Applicable.
- 9. Additional Criteria for Transuranic/Transuranic Mixed Waste - Not Applicable.
- 10. Additional Criteria for Bulk Waste - Not applicable.

11. Additional Criteria for Case-by-Case Waste - Not Applicable.
12. Waste Stream Characterization Data Sheet: Figure 10
13. Three-Year Waste Shipment Forecast: Figure 11
14. Packaging and Shipping Information:
 - a. DOT Proper Shipping Name: Radioactive Material, Low Specific Activity (LSA), n.o.s., Limited Quantity, n.o.s., or _____
 - b. Hazard Class: Radioactive Material
 - c. Hazard Identification Number: UN 2912, UN 2910, or UN _____
 - d. Container Type: Strong, Tight Package or Drums
15. Waste Security Information: None Required

Figure 9
Waste Certification Flow Diagram - LCAB-000000003

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: LCAB-000000003
2. Waste Description:
 - a. Physical Characteristics: Depleted Uranium
 - b. Special Handling/Disposal Requirements: None
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)? No
 - 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:

	Nuclide	Specific Activity Range			(Units)
		Low	Mean	High	
(1)	Depleted Uranium	0.05		1.0	$\mu\text{Ci/g}$
(2)	Depleted Uranium Contamination	2×10^{-3}		10	$\mu\text{Ci}/100\text{cm}^2$
(3)					
(4)					

5. Hazardous Characteristics (for mixed waste): NONE
 - a. Basis for Identifying as Mixed Waste (circle): (1) Ignitable, (2) Reactive, (3) Corrosive, (4) TCLP, (5) Listed 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 Forms. - Not Applicable

Figure 10
Waste Stream Characterization Data Sheet - LCAB-000000003

Three-Year Waste Shipment Forecast - LCAB-0000000003

Figure 11

THREE-YEAR WASTE SHIPMENT FORECAST

GENERATOR

PREPARED BY

DATE

FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME
			TYPE	SIZE	WEIGHT		
FY 1992	LCAB-0000000003						
10/01 - 12/31							
01/01 - 03/31							
04/01 - 06/30							
07/01 - 09/30							
FY 1993							
FY 1994							

REMARKS

D. Tritium

1. Waste Stream Identification Number: LCAB-000000004
2. Waste Type: Low-Level Waste
3. Waste Description: This waste stream consists of tritiated water from emplacement holes in a liquid scintillation cocktail and tritium swipes from an underground nuclear weapons test sampling hole . An approved solidifying agent is added to solidify the waste.
4. Waste Certification Flow Diagram: Figure 12
5. General Waste Form Criteria

- a. *Transuranics: LLW must have a transuranic nuclide concentration less than 100 nCi/g. The mass of the waste container including shielding shall not be used in calculating the specific activity of the waste in accordance with NVO-325, Section 5.5.1.1.A.*

Compliance Method: All transuranic nuclide concentrations are below 100 nanocuries per gram.

- b. *Hazardous Waste Components: LLW 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 in Division 45 Chapter 11. (NVO-325, Section 5.5.1.1.B)*

Compliance Method: This waste stream contains no listed or characteristic hazardous material as identified in 40 CFR 261.

- c. *Free Liquids: Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions (NVO-325, Section 5.5.1.1.C).*

Compliance Method: This waste stream shall be solidified with an approved solidifying agent so that the waste package contains no more than 0.5% by volume of free liquids, in accordance with NVO-325, Section 5.5.1.1.C. The Paint Filter Test, EPA SW-846, is not applicable to this waste stream as it is solidified in its final form using an approved solidifying agent.

- d. *Particulates: Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent less-than-ten-micrometer-diameter particles, or 15 weight percent 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 mobilized. (NVO-325, Section 5.5.1.1.D)

Compliance Method: This waste contains no particulates as defined in NVO-325, Section 5.5.1.1.D.

- e. Gases: *LLW gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 15 atmosphere 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.*

Compliance Method: This waste stream contains no compressed gases or aerosol cans. It is not anticipated that any gases will be formed as a result of the natural decay of tritium.

- f. Stabilization: *Where practical, waste shall be treated to reduce volume, promote waste minimization and provide more structurally and chemically stable waste form. (NVO-325, Section 5.5.1.1.F)*

Compliance Method: This waste stream is solidified material and is chemically stable. The waste will not react with the packaging or contents during storage, shipping, and handling.

- g. Etiologic Agents: *LLW 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, Section 5.5.1.1.G)*

Compliance Method: This waste stream contains no pathogens, infectious wastes, or other etiological agents as defined in 49 CFR 173.386.

- h. Chelating Agents: *LLW containing chelating or complexing agents at concentrations greater than one percent by weight of e waste form will not be accepted (NVO-325, Section 5.5.1.1.H)*

Compliance Method: This waste stream contains no chelating or complexing agents.

- i. Polychlorinated Biphenyls (PCBs): *PCB contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325, Section 5.5.1.1.I)*

Compliance Method: This waste stream does not contain PCBs.

- j. Explosives and Pyrophorics: LLW 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, Section 5.5.1.1.J)

Compliance Method: This waste does not contain explosive or pyrophoric material.

6. General Regulatory Waste Package Criteria

*** Strong, tight packaging may be used for shipping limited quantities and low specific activity waste only. ***

- a. Design: Type of packaging shall be designed to meet Title 49 CFR 73.411, "General Design Requirements," and Title CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOT 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 packing used for shipping limited quantities and low specific activity LLW 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, Section 5.5.1.2.A)

Compliance Method: The package used is a strong, tight package or DOT-approved steel drums for shipping LSA, Limited Quantity, or _____ radioactive material, as excepted by 49 CFR 173.425 and 173.421, and will not leak during normal transportation and handling.

- b. Nuclear Safety: 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 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, Section 5.5.1.2.B)

Compliance Method: The LLW to be shipped is LSA, Limited Quantity, or _____ and type is not fissionable material by quantity. Any amount of this material could be packaged and transported and remain subcritical.

- c. Nuclear Heating: 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 of accessible external package surfaces. (NVO-325, Section 5.5.1.2.C)

Compliance Method: The material to be shipped will be limited so the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity.

- d. Radiation Levels: *The external radiation levels for packages shall not exceed 200 millirems per hour 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, Section 5.5.1.2.D)*

Compliance Method: The external package radiation levels shall not exceed 200 millirem/hour on contact unless specifically excepted by DOT regulations. LANL radiation limits meet the requirements set forth in 49 CFR 173.441.

- e. External Contamination: *Packages shall be within DOT contamination limits upon receipt at NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325, Section 5.5.1.2.E)*

Compliance Method: Packages shipped on the NTS shall, at a minimum, meet contamination control requirements set forth in 49 CFR 173.443 and DOE Order 5480.11, Attachment 2, levels.

- f. Activity Limits: *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, Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325, Section 5.5.1.2.F)*

Compliance Method: Packages shipped shall not exceed the activity limits for **Limited Quantity** radioactive materials as defined in 49 CFR 173.421 and shall meet transport requirements for **LSA** radioactive materials as defined in 49 CFR 173.425 and NVO-325.

- g. Multiple Hazards: *Waste containing multiple hazards shall be packaged according the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." (NVO-325, Section 5.5.1.2.G)*

Compliance Method: This LLW is defined as a single hazard class (radioactive).

7. NTS Specific Package Criteria

- 1
- a. Closure: *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, Section 5.5.1.3.A)*

Compliance Method: Each drum shall be closed and sealed with _____ to prevent leakage during normal handling. Each wooden box shall be closed and sealed with _____ to prevent leakage during normal handling. Closure will not serve as a weak point for package failure.

- b. Strength: *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 lbs/ft²). This is required to support other waste packages and earth cover without crashing during stacking and covering operations. (NVO-325, Section 5.5.1.3.B)*

Compliance Method: Wooden boxes shall be strong, tight containers and shall be documented to meet NVO-325 compressive strength requirements; steel drums are exempt from NTS strength requirements as specified in NVO-325, Section 5.5.1.3.B.

- c. Handling: *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, Section 5.5.1.3.D)*

Compliance Method: Wooden boxes shall have permanently attached skids; there are no special handling requirements for drums.

- d. Size: *1.2-x 1.2-x 2.1m(4-x 4-x 7-ft) or 1.2-x 2.1m(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, 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, Section 5.5.1.3.D)

Compliance Method: Waste shall be packaged and shipped in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, or 5- to 55-gallon, DOT-approved or equivalent type drums.

- e. Weight: *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 4,082kg(9,000 pounds) require crane or large forklift removal and must be approved by the REEC Co Waste Management Department (WMD) prior to shipment. Shipments of this type must be in a removable-side trailer. (NVO-325, Section 5.5.1.3.E)*

Compliance Method: The maximum gross weight of any wooden box will not exceed 9,000 pounds; the maximum gross weight of any drum will not exceed 1,200 pounds.

- f. Loading: *Waste package 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.*

Compliance Method: Waste packages shall be loaded to ensure the interior volume is loaded as efficiently and compactly as possible. When packaging bulky items, smaller, similarly contaminated items will be added to fill as much void space as possible.

- g. Nonstandard Type A Packaging: *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, Section 5.5.1.3.G)*

Compliance Method: LANL will not be utilizing any nonstandard Type A packaging. Strong, tight containers and 5- to 55-gallon, DOT-approved drums as specified in NVO-325 shall be used.

- h. Package Protection: *The generator shall take the following precautions to protect the waste package after closure.*

(1) 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.

- (2) A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.*
- (3) 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 RWMS 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 5840.11 will be charged to the waste generator. (NVO-325, Section 5.5.1.3.H).*

Compliance Method:

- (1) The preshipment storage environment is controlled to prevent adverse effects due to weather and climate. Each waste package shall be prepared so as to minimize damage during transit.*
 - (2) A _____ Tamper Indicating Device will be applied to each waste container once certification actions have been completed.*
 - (3) Packages will be properly blocked and braced in the transport vehicle using standard DOT methodology to prevent damage during transport.*
- i. Marking and Labeling: Each waste package shall have the following information:*
- (1) Marking and labeling is required in Title 49 CFR 172, Subparts D and E.*
 - (2) Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (see figure 8, page 84 of the NVO-325). If the waste is unpacked bulk, a signed NV-211 label*
 - (3) Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REECO/WMD (see Appendix D in the NVO-325); one alpha-character for type of waste - L for LLW, 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.*

- (4) *Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.*
- (5) *Approved 13-digit waste stream identification number (see Section 5.1 in the NVO-325).*
- (6) *Package weight in units of pounds and kilograms. (NVO-325, Section 5.5.1.3.1)*

Compliance Method:

- (1) Marking and labeling shall be performed as required in Title 49 CFR 172, subparts D and E.
- (2) A signed NV-211, "Packaging Certification," label shall be completed and affixed to each container.
- (3) Shipment Number: The shipment number will be marked on the container in characters at least one-half inch in height. The shipment number will be an eight (8) character number: the first two characters will be "L" and "A" (assigned by REEC Co WMD); the third character will be "L" for low-level waste; the fourth and fifth characters will represent the fiscal year (i.e., 92); and the last three characters will be the shipment number, consecutively numbered from the first shipment made by LANL to the NTS each fiscal year. Example: LAL92001
- (4) Package Number: The unique package identification number shall be marked on the container in characters at least one-half inch in height. The package identification number shall be six characters with no duplication within that shipment. Example: S00001
- (5) Waste Stream Identification Numbers shall be 13 characters in length. The first four characters will be the DOE-assigned WMIS generator code and the remaining nine characters are the generator-assigned waste stream code. Example: LCAB-000000004
- (6) Package weight in pounds and kilograms will be marked on the container and will be at least one-half inch in height.
- j. **Barcoding:** *The shipment, package, and waste stream identification numbers shall be barcoded according to the following:*
 - (1) Code 39
 - (2) Medium to high density, high density preferred.

- (3) 1.0" high barcode.
- (4) Human readable interpretation (HRI) 0.50" high printed below the barcode.
- (5) Spacing between the barcode and HRI will be 0.10".
- (6) Minimum left and right margin (quiet zones) will be
- (7) 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.
- (8) 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.
- (9) A sample barcode must be submitted to REEC/WMD prior to the first shipment to ensure that REEC/WMD equipment can be used to read the barcode. (NVO-325, Section 5.5.1.3.J)

Compliance Method: As a low-volume generator (less than 10 shipments per year), barcoding is requested to be provided by REEC/WMD as specified in NVO-325, Section 5.5.1.3.J.9. LANL will contact the WMD at least one month in advance to arrange for the barcodes. Two barcode labels shall be placed on each box, near the top and on opposite sides. Two barcode labels shall be placed on each drum, one on top of the drum lid and one on the side near the top.

- k. On-Site Transfer: Onsite transfer must be in accordance with NV 54Xg.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpacked bulk material having external contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325, Section 5.5.1.3.K)

Compliance Method: On-site transfer on behalf of LANL will be coordinated with, and performed by, qualified REEC personnel in accordance with NV Order 54XG.1-39, "NV Radiological Safety Manual"; applicable DOT requirements; and any additional requirements as stated in NVO-325.

- 8. Additional Criteria for Mixed Waste - Not Applicable.
- 9. Additional Criteria for Transuranic/Transuranic Mixed Waste - Not Applicable.

10. Additional Criteria for Bulk Waste - Not applicable.
11. Additional Criteria for Case-by-Case Waste - Not Applicable.
12. Waste Stream Characterization Data Sheet: Figure 13
13. Three-Year Waste Shipment Forecast: Figure 14
14. Packaging and Shipping Information:
 - a. DOT Proper Shipping Name: Radioactive Material, Low Specific Activity (LSA), n.o.s., Limited Quantity, n.o.s., or _____
 - b. Hazard Class: Radioactive Material
 - c. Hazard Identification Number: UN 2912, UN 2910, or UN _____
 - d. Container Type: Strong, Tight Package or Drums
15. Waste Security Information: None Required

Figure 12
Waste Certification Flow Diagram - LCAB-000000004

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: LCAB-0000000004

2. Waste Description:

a. Physical Characteristics: Tritium in Liquid Scintillation Cocktail

b. Special Handling/Disposal Requirements: None

3. Basis for Characterization:

a. Process Knowledge: _____

b. Analytical Knowledge: _____

c. Both: X

(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)? No

b. SWIMS Nuclide Category (circle): 1 2 3 4 5 6 7 8

c. Radioactive Constituents:

	<u>Nuclide</u>	<u>Specific Activity Range</u>			<u>(Units)</u>
		<u>Low</u>	<u>Mean</u>	<u>High</u>	
(1)	³ H	1		10 ⁵	pCi/g
(2)					
(3)					
(4)					

5. Hazardous Characteristics (for mixed waste): NONE

a. Basis for Identifying as Mixed Waste (circle): (1) Ignitable, (2) Reactive, (3) Corrosive, (4) TCLP, (5) Listed Waste - Not Applicable

b. List all applicable EPA waste code, the chemical name, the treatment performed (if applicable) and the Regulatory/Treatment Standard. Attach Standardized Data Forms. - Not Applicable

Figure 13

Waste Stream Characterization Data Sheet - LCAB-0000000004

THREE-YEAR WASTE SHIPMENT FORECAST

GENERATOR

PREPARED BY

DATE

FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME
			TYPE	SIZE	WEIGHT		
FY 1992	LCAB-000000004						
10/01 - 12/31							
01/01 - 03/31							
04/01 - 06/30							
07/01 - 09/30							
FY 1993							
FY 1994							

REMARKS

E. Tunnel Debris

1. Waste Stream Identification Number: LCAB-000000005
2. Waste Type: Low-Level Waste
3. Waste Description: This waste stream consists of various experimental packages and/or instruments recovered from an underground nuclear weapons test experiment chamber. These experimental packages are removed from the experiment chamber for data recovery and decontamination. In some cases these instruments and/or experiment packages are damaged or otherwise not reusable and constitute waste. Waste characterization for this waste is specific to the event and known composition of the experimental parts. Specific concerns include parts made of radioactive material, radioactive activation, and radioactive low-level contamination.
4. Waste Certification Flow Diagram: Figure 15
5. General Waste Form Criteria

- a. *Transuranics: LLW must have a transuranic nuclide concentration less than 100 nCi/g. The mass of the waste container including shielding shall not be used in calculating the specific activity of the waste in accordance with NVO-325, Section 5.5.1.1.A.*

Compliance Method: All transuranic nuclide concentrations are below 100 nanocuries per gram.

- b. *Hazardous Waste Components: LLW 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 in Division 45 Chapter 11. (NVO-325, Section 5.5.1.1.B)*

Compliance Method: This waste stream contains no listed or characteristic hazardous material as identified in 40 CFR 261.

- c. *Free Liquids: Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions (NVO-325, Section 5.5.1.1.C).*

Compliance Method: This waste stream contains no free liquids as defined in NVO-325, Section 5.5.1.1.C. The Paint Filter Test, EPA SW-846, is not applicable to this waste stream.

- d. Particulates: Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent less-than-ten-micrometer-diameter particles, or 15 weight percent 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 mobilized. (NVO-325, Section 5.5.1.1.D)

Compliance Method: Particulates: This waste stream contains no particulates as defined in NVO-325, Section 5.5.1.1.D.

- e. Gases: LLW gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 15 atmosphere 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.

Compliance Method: This waste stream contains no compressed gases or aerosol cans. The only gas anticipated to be present is a minor amount of radon from the natural decay of uranium.

- f. Stabilization: Where practical, waste shall be treated to reduce volume, promote waste minimization and provide more structurally and chemically stable waste form. (NVO-325, Section 5.5.1.1.F)

Compliance Method: This waste stream is solid material and is chemically stable. The waste will not react with the packaging or contents during storage, shipping, and handling.

- g. Etiologic Agents: LLW 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, Section 5.5.1.1.G)

Compliance Method: This waste stream contains no pathogens, infectious wastes, or other etiological agents as defined in 49 CFR 173.386.

- h. Chelating Agents: LLW containing chelating or complexing agents at concentrations greater than one percent by weight of the waste form will not be accepted (NVO-325, Section 5.5.1.1.H)

Compliance Method: This waste stream contains no chelating or complexing agents.

- i. Polychlorinated Biphenyls (PCBs): PCB contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325, Section 5.5.1.1.I)

Compliance Method: This waste does not contain explosive or pyrophoric material.

- j. Explosives and Pyrophorics: LLW 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, Section 5.5.1.1.J)

Compliance Method: This waste does not contain explosive or pyrophoric material.

6. General Regulatory Waste Package Criteria

- a. Design: Type of packaging shall be designed to meet Title 49 CFR 73.411, "General Design Requirements," and Title CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOT 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 packing used for shipping limited quantities and low specific activity LLW 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, Section 5.5.1.2.A)

*** Strong, tight packaging may be used for shipping limited quantities and low specific activity waste only. ***

Compliance Method: The package used is a strong, tight package or DOT-approved steel drums for shipping LSA, Limited Quantity, or _____ radioactive material, as excepted by 49 CFR 173.425 and 173.421, and will not leak during normal transportation and handling.

- b. Nuclear Safety: 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 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, Section 5.5.1.2.B)

Compliance Method: The LLW to be shipped is LSA, Limited Quantity, or _____ and type is not fissionable material by

quantity. Any amount of this material could be packaged and transported and remain subcritical.

- c. *Nuclear Heating:* *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 of accessible external package surfaces. (NVO-325, Section 5.5.1.2.C)*

Compliance Method: The material to be shipped will be limited so the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity.

- d. *Radiation Levels:* *The external radiation levels for packages shall not exceed 200 millirems per hour 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, Section 5.5.1.2.D)*

Compliance Method: The external package radiation levels shall not exceed 200 millirem/hour on contact unless specifically excepted by DOT regulations. LANL radiation limits meet the requirements set forth in 49 CFR 173.441.

- e. *External Contamination:* *Packages shall be within DOT contamination limits upon receipt at NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325, Section 5.5.1.2.E)*

Compliance Method: Packages shipped on the NTS shall, at a minimum, meet contamination control requirements set forth in 49 CFR 173.443 and DOE Order 5480.11, Attachment 2, levels.

- f. *Activity Limits:* *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, Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325, Section 5.5.1.2.F)*

Compliance Method: Packages shipped shall not exceed the activity limits for **Limited Quantity** radioactive materials as defined in 49 CFR 173.421 and shall meet transport requirements for **LSA** radioactive materials as defined in 49 CFR 173.425 and NVO-325.

- g. Multiple Hazards: Waste containing multiple hazards shall be packaged according the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." (NVO-325, Section 5.5.1.2.G)*

Compliance Method: This LLW is defined as a single hazard class (radioactive).

7. NTS Specific Package Criteria

- a. Closure: 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, Section 5.5.1.3.A)*

Compliance Method: Each drum shall be closed and sealed with _____ to prevent leakage during normal handling. Each wooden box shall be closed and sealed with _____ to prevent leakage during normal handling. Closure will not serve as a weak point for package failure.

- b. Strength: 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 lbs/ft²). This is required to support other waste packages and earth cover without crashing during stacking and covering operations. (NVO-325, Section 5.5.1.3.B)*

Compliance Method: Wooden boxes shall be strong, tight containers and shall be documented to meet NVO-325 compressive strength requirements; steel drums are exempt from NTS strength requirements as specified in NVO-325, Section 5.5.1.3.B.

- c. Handling: 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, Section 5.5.1.3.D)*

Compliance Method: Wooden boxes shall have permanently attached skids; there are no special handling requirements for drums.

- d. Size: 1.2-x 1.2-x 2.1m(4-x 4-x 7-ft) or 1.2-x 2.1m(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, 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, Section 5.5.1.3.D)

Compliance Method: Waste shall be packaged and shipped in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, or 5- to 55-gallon, DOT-approved or equivalent type drums.

- e. Weight: 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 4,082kg(9,000 pounds) require crane or large forklift removal and must be approved by the REECo Waste Management Department (WMD) prior to shipment. Shipments of this type must be in a removable-side trailer. (NVO-325, Section 5.5.1.3.E)

Compliance Method: The maximum gross weight of any wooden box will not exceed 9,000 pounds; the maximum gross weight of any drum will not exceed 1,200 pounds.

- f. Loading: Waste package 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.

Compliance Method: Waste packages shall be loaded to ensure the interior volume is loaded as efficiently and compactly as possible. When packaging bulky items, smaller, similarly contaminated items will be added to fill as much void space as possible.

- g. Nonstandard Type A Packaging: 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, Section 5.5.1.3.G)

Compliance Method: LANL will not be utilizing any nonstandard Type A packaging. Strong, tight containers and 5- to 55-gallon, DOT-approved drums as specified in NVO-325 shall be used.

- h. Package Protection: The generator shall take the following precautions to protect the waste package after closure.

- (1) *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.*
- (2) *A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.*
- (3) *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 RWMS 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 5840.11 will be charged to the waste generator. (NVO-325, Section 5.5.1.3.H).*

Compliance Method:

- (1) The preshipment storage environment is controlled to prevent adverse effects due to weather and climate. Each waste package shall be prepared so as to minimize damage during transit.
 - (2) A _____ Tamper Indicating Device will be applied to each waste container once certification actions have been completed.
 - (3) Packages will be properly blocked and braced in the transport vehicle using standard DOT methodology to prevent damage during transport.
- i. Marking and Labeling: *Each waste package shall have the following information:*
- (1) *Marking and labeling is required in Title 49 CFR 172, Subparts D and E.*
 - (2) *Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (see figure 8, page 84 of the NVO-325). If the waste is unpacked bulk, a signed NV-211 label*
 - (3) *Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REECo/WMD (see Appendix D in the NVO-325); one alpha-character for type of waste - L for LLW, 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.

- (4) Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.*
- (5) Approved 13-digit waste stream identification number (see Section 5.1 in the NVO-325).*
- (6) Package weight in units of pounds and kilograms. (NVO-325, Section 5.5.1.3.)*

Compliance Method:

- (1) Marking and labeling shall be performed as required in Title 49 CFR 172, subparts D and E.
- (2) A signed NV-211, "Packaging Certification," label shall be completed and affixed to each container.
- (3) Shipment Number: The shipment number will be marked on the container in characters at least one-half inch in height. The shipment number will be an eight (8) character number: the first two characters will be "L" and "A" (assigned by REEC Co WMD); the third character will be "L" for low-level waste; the fourth and fifth characters will represent the fiscal year (i.e., 92); and the last three characters will be the shipment number, consecutively numbered from the first shipment made by LANL to the NTS each fiscal year. Example: LAL92001
- (4) Package Number: The unique package identification number shall be marked on the container in characters at least one-half inch in height. The package identification number shall be six characters with no duplication within that shipment. Example: S00001
- (5) Waste Stream Identification Numbers shall be 13 characters in length. The first four characters will be the DOE-assigned WMIS generator code and the remaining nine characters are the generator-assigned waste stream code. Example: LCAB-000000005
- (6) Package weight in pounds and kilograms will be marked on the container and will be at least one-half inch in height.

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

- (1) Code 39
- (2) Medium to high density, high density preferred.
- (3) 1.0" high barcode.
- (4) Human readable interpretation (HRI) 0.50" high printed below the barcode.
- (5) Spacing between the barcode and HRI will be 0.10".
- (6) Minimum left and right margin (quiet zones) will be
- (7) 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.
- (8) 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.
- (9) A sample barcode must be submitted to REEC/WMD prior to the first shipment to ensure that REEC/WMD equipment can be used to read the barcode. (NVO-325, Section 5.5.1.3.J)

Compliance Method: As a low-volume generator (less than 10 shipments per year), barcoding is requested to be provided by REEC/WMD as specified in NVO-325, Section 5.5.1.3.J.9. LANL will contact the WMD at least one month in advance to arrange for the barcodes. Two barcode labels shall be placed on each box, near the top and on opposite sides. Two barcode labels shall be placed on each drum, one on top of the drum lid and one on the side near the top.

k. On-Site Transfer: Onsite transfer must be in accordance with NV 54Xg.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpacked bulk material having external contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325, Section 5.5.1.3.K)

k. Compliance Method: On-site transfer on behalf of LANL will be coordinated with, and performed by, qualified REEC personnel in accordance with NV Order 54XG.1-39, "NV Radiological Safety

Manual"; applicable DOT requirements; and any additional requirements as stated in NVO-325.

8. Additional Criteria for Mixed Waste - Not Applicable.
9. Additional Criteria for Transuranic/Transuranic Mixed Waste - Not Applicable.
10. Additional Criteria for Bulk Waste - Not applicable.
11. Additional Criteria for Case-by-Case Waste - Not Applicable.
12. Waste Stream Characterization Data Sheet: Figure 16
13. Three-Year Waste Shipment Forecast: Figure 17
14. Packaging and Shipping Information:
 - a. DOT Proper Shipping Name: Radioactive Material, Low Specific Activity (LSA), n.o.s., Limited Quantity, n.o.s., or _____
 - b. Hazard Class: Radioactive Material
 - c. Hazard Identification Number: UN 2912, UN 2910, or UN _____
 - d. Container Type: Strong, Tight Package or Drums
15. Waste Security Information: None Required

Figure 15
Waste Certification Flow Diagram - LCAB-000000005

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: LCAB-000000005

2. Waste Description:

a. Physical Characteristics: Tunnel Debris

b. Special Handling/Disposal Requirements: None

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)? No

b. SWIMS Nuclide Category (circle): 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐

c. Radioactive Constituents:

	Nuclide	Specific Activity Range			(Units)
		Low	Mean	High	
(1)	¹⁰³ Ru	> 2 x 10 ⁻³		1	μCi/100cm ²
(2)	¹³⁷ Cs	> 2 x 10 ⁻³		1	μCi/100cm ²
(3)	¹⁰⁶ Ru-Rh	> 2 x 10 ⁻³		1	μCi/100cm ²
(4)	¹²⁴ Sb	> 2 x 10 ⁻³		1	μCi/100cm ²
(5)	¹⁴¹ Ce	> 2 x 10 ⁻³		1	μCi/100cm ²
(6)	⁹⁵ Zr-Nb	> 2 x 10 ⁻³		1	μCi/100cm ²
(7)	¹⁴⁰ Ba-La	> 2 x 10 ⁻³		1	μCi/100cm ²
(8)	Depleted Uranium	0.05	0.3	1	μCi/g
(9)	Depleted Uranium	> 2 x 10 ⁻³		1	μCi/100cm ²
(10)	⁶⁰ Co	> 2 x 10 ⁻³		1	μCi/100cm ²
(11)	⁵⁸ Co	> 2 x 10 ⁻³		1	μCi/100cm ²
(12)	⁵⁴ Mn	> 2 x 10 ⁻³		1	μCi/100cm ²
(13)	⁶⁰ Co	10 ⁻⁵		1	μCi/g
(14)	⁵⁸ Co	10 ⁻⁵		1	μCi/g
(15)	⁵⁴ Mn	10 ⁻⁵		1	μCi/g

5. Hazardous Characteristics (for mixed waste): NONE

a. Basis for Identifying as Mixed Waste (circle): (1) Ignitable, (2) Reactive, (3) Corrosive, (4) TCLP, (5) Listed Waste - Not Applicable

Figure 16

Waste Stream Characterization Data Sheet - LCAB-000000005

THREE-YEAR WASTE SHIPMENT FORECAST

GENERATOR	FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME
				TYPE	SIZE	WEIGHT		
	FY 1992	LCAB-0000000005						
	10/01 - 12/31							
	01/01 - 03/31							
	04/01 - 06/30							
	07/01 - 09/30							
	FY 1993							
	FY 1994							

REMARKS

Figure 17
Three-Year Waste Shipment Forecast - LCAB-0000000005

F. Laboratory Waste

1. Waste Stream Identification Number: LCAB-000000006
2. Waste Type: Low-Level Waste
3. Waste Description: This waste stream consists of material contaminated with radioactivity as the result of laboratory analysis procedures, decontamination, and/or waste handling activities. They include plastic bags, tape, filter papers, gloves, coveralls, etc.
4. Waste Certification Flow Diagram: Figure 18
5. General Waste Form Criteria

- a. *Transuranics: LLW must have a transuranic nuclide concentration less than 100 nCi/g. The mass of the waste container including shielding shall not be used in calculating the specific activity of the waste in accordance with NVO-325, Section 5.5.1.1.A.*

Compliance Method: All transuranic nuclide concentrations are below 100 nanocuries per gram.

- b. *Hazardous Waste Components: LLW 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 in Division 45 Chapter 11. (NVO-325, Section 5.5.1.1.B)*

Compliance Method: This waste stream contains no listed or characteristic hazardous material as identified in 40 CFR 261.

- c. *Free Liquids: Free liquids mean liquids which readily separate from the solid portion of a waste under ambient temperature and pressure conditions (NVO-325, Section 5.5.1.1.C).*

Compliance Method: This waste stream is solid and contains no free liquids as defined in NVO-325, Section 5.5.1.1.C. The Paint Filter Test, EPA SW-846, is not applicable to this waste stream.

- d. *Particulates: Fine particulate wastes shall be immobilized so that the waste package contains no more than one weight percent less-than-ten-micrometer-diameter particles, or 15 weight percent 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 mobilized. (NVO-325, Section 5.5.1.1.D)*

Compliance Method: This waste stream contains no particulates as defined in with NVO-325, Section 5.5.1.1.D.

- e. Gases: *LLW gases shall be stabilized or absorbed so that pressure in the waste package does not exceed 15 atmosphere 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.*

Compliance Method: This waste stream contains no compressed gases or aerosol cans. There are no gases anticipated to be present as a result of the natural decay of the elements contained in this waste stream.

- f. Stabilization: *Where practical, waste shall be treated to reduce volume, promote waste minimization and provide more structurally and chemically stable waste form. (NVO-325, Section 5.5.1.1.F)*

Compliance Method: This waste stream is solid material and is chemically stable. The waste will not react with the packaging or contents during storage, shipping, and handling.

- g. Etiologic Agents: *LLW 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, Section 5.5.1.1.G)*

Compliance Method: This waste stream contains no pathogens, infectious wastes, or other etiological agents as defined in 49 CFR 173.386.

- h. Chelating Agents: *LLW containing chelating or complexing agents at concentrations greater than one percent by weight of e waste form will not be accepted (NVO-325, Section 5.5.1.1.H)*

Compliance Method: This waste stream contains no chelating or complexing agents.

- i. Polychlorinated Biphenyls (PCBs): *PCB contaminated LLW will not be accepted for disposal at NTS unless the PCB concentration meets municipal solid waste disposal levels of 50ppm or less. See Title 40 CFR 761.60 for PCB disposal requirements. (NVO-325, Section 5.5.1.1.I)*

Compliance Method: This waste stream does not contain PCBs.

- j. Explosives and Pyrophorics: LLW 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, Section 5.5.1.1.J)

Compliance Method: This waste does not contain explosive or pyrophoric material.

6. General Regulatory Waste Package Criteria

- a. Design: Type of packaging shall be designed to meet Title 49 CFR 73.411, "General Design Requirements," and Title CFR 173.412, "Additional Design Requirements for Type A Packages." Type A packages must have been evaluated under the DOT 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 packing used for shipping limited quantities and low specific activity LLW 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, Section 5.5.1.2.A)

Compliance Method: The package used is a strong, tight package or DOT-approved steel drums for shipping LSA, Limited Quantity, or _____ radioactive material, as excepted by 49 CFR 173.425 and 173.421, and will not leak during normal transportation and handling.

- b. Nuclear Safety: 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 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, Section 5.5.1.2.B)

Compliance Method: The LLW to be shipped is LSA, Limited Quantity, or _____ and type is not fissionable material by quantity. Any amount of this material could be packaged and transported and remain subcritical.

- c. Nuclear Heating: 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 of accessible external package surfaces. (NVO-325, Section 5.5.1.2.C)

Compliance Method: The material to be shipped will be limited so the effects of nuclear decay heat will not adversely affect the physical or chemical stability of the contents or package integrity.

- d. Radiation Levels: *The external radiation levels for packages shall not exceed 200 millirems per hour 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, Section 5.5.1.2.D)*

Compliance Method: The external package radiation levels shall not exceed 200 millirem/hour on contact unless specifically excepted by DOT regulations. LANL radiation limits meet the requirements set forth in 49 CFR 173.441.

- e. External Contamination: *Packages shall be within DOT contamination limits upon receipt at NTS. See Title 49 CFR 173.443, "Contamination Control." (NVO-325, Section 5.5.1.2.E)*

Compliance Method: Packages shipped on the NTS shall, at a minimum, meet contamination control requirements set forth in 49 CFR 173.443 and DOE Order 5480.11, Attachment 2, levels.

- f. Activity Limits: *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, Section 5.5.5.2 for additional requirements for activity limits outside of this range. (NVO-325, Section 5.5.1.2.F)*

Compliance Method: Packages shipped shall not exceed the activity limits for **Limited Quantity** radioactive materials as defined in 49 CFR 173.421 and shall meet transport requirements for **LSA** radioactive materials as defined in 49 CFR 173.425 and NVO-325

- g. Multiple Hazards: *Waste containing multiple hazards shall be packaged according the level of hazards as defined in Title 49 CFR 173.2, "Classification of Material Having More than One Hazard." (NVO-325, Section 5.5.1.2.G)*

Compliance Method: This LLW is defined as a single hazard class (radioactive).

7. NTS Specific Package Criteria

- a. **Closure:** *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, Section 5.5.1.3.A)*

Compliance Method: Each drum shall be closed and sealed with _____ to prevent leakage during normal handling. Each wooden box shall be closed and sealed with _____ to prevent leakage during normal handling. Closure will not serve as a weak point for package failure.

- b. **Strength:** *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 lbs/ft²). This is required to support other waste packages and earth cover without crashing during stacking and covering operations. (NVO-325, Section 5.5.1.3.B)*

Compliance Method: Wooden boxes shall be strong, tight containers and shall be documented to meet NVO-325 compressive strength requirements; steel drums are exempt from NTS strength requirements as specified in NVO-325, Section 5.5.1.3.B.

- c. **Handling:** *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, Section 5.5.1.3.D)*

Compliance Methods: Wooden boxes shall have permanently attached skids; there are no special handling requirements for drums.

- d. **Size:** *1.2-x 1.2-x 2.1m(4-x 4-x 7-ft) or 1.2-x 2.1m(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, 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, Section 5.5.1.3.D)*

Compliance Method: Waste shall be packaged and shipped in 4' x 4' x 7' or 4' x 2' x 7' wooden boxes, or 5- to 55-gallon, DOT-approved or equivalent type drums.

- e. Weight: *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 4,082kg(9,000 pounds) require crane or large forklift removal and must be approved by the REEC Co Waste Management Department (WMD) prior to shipment. Shipments of this type must be in a removable-side trailer. (NVO-325, Section 5.5.1.3.E)*

Compliance Method: The maximum gross weight of any wooden box will not exceed 9,000 pounds; the maximum gross weight of any drum will not exceed 1,200 pounds.

- f. Loading: *Waste package 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.*

Compliance Method: Waste packages shall be loaded to ensure the interior volume is loaded as efficiently and compactly as possible. When packaging bulky items, smaller, similarly contaminated items will be added to fill as much void space as possible.

- g. Nonstandard Type A Packaging: *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, Section 5.5.1.3.G)*

Compliance Method: LANL will not be utilizing any nonstandard Type A packaging. Strong, tight containers and 5- to 55-gallon, DOT-approved drums as specified in NVO-325 shall be used.

- h. Package Protection: *The generator shall take the following precautions to protect the waste package after closure.*

(1) *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.*

- (2) *A form of Tamper Indicating Device (TID) shall be applied to each waste container once certification actions have been completed.*
- (3) *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 RWMS 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 5840.11 will be charged to the waste generator. (NVO-325, Section 5.5.1.3.H).*

Compliance Method:

- (1) The preshipment storage environment is controlled to prevent adverse effects due to weather and climate. Each waste package shall be prepared so as to minimize damage during transit.
- (2) A _____ Tamper Indicating Device will be applied to each waste container once certification actions have been completed.
- (3) Packages will be properly blocked and braced in the transport vehicle using standard DOT methodology to prevent damage during transport.

i. Marking and Labeling: Each waste package shall have the following information:

- (1) *Marking and labeling is required in Title 49 CFR 172, Subparts D and E.*
- (2) *Signed NV-211, "Packaging Certification" label (revision date January 27, 1989) (see figure 8, page 84 of the NVO-325). If the waste is unpacked bulk, a signed NV-211 label*
- (3) *Shipment number in the following sequence: Two alpha-character generator site designator code assigned by REEC/WMD (see Appendix D in the NVO-325); one alpha-character for type of waste - L for LLW, 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.*
- (4) *Package number shall be six characters (alpha, numeric, or combination) with no duplication within that shipment.*

(5) *Approved 13-digit waste stream identification number (see Section 5.1 in the NVO-325).*

(6) *Package weight in units of pounds and kilograms. (NVO-325, Section 5.5.1.3.1)*

Compliance Method:

(1) Marking and labeling shall be performed as required in Title 49 CFR 172, subparts D and E.

(2) A signed NV-211, "Packaging Certification," label shall be completed and affixed to each container.

(3) **Shipment Number:** The shipment number will be marked on the container in characters at least one-half inch in height. The shipment number will be an eight (8) character number: the first two characters will be "L" and "A" (assigned by REEC Co WMD); the third character will be "L" for low-level waste; the fourth and fifth characters will represent the fiscal year (i.e., 92); and the last three characters will be the shipment number, consecutively numbered from the first shipment made by LANL to the NTS each fiscal year. Example: LAL92001

(4) **Package Number:** The unique package identification number shall be marked on the container in characters at least one-half inch in height. The package identification number shall be six characters with no duplication within that shipment. Example: S00001

(5) **Waste Stream Identification Numbers** shall be 13 characters in length. The first four characters will be the DOE-assigned WMIS generator code and the remaining nine characters are the generator-assigned waste stream code. Example: LCAB-000000006

(6) **Package weight in pounds and kilograms** will be marked on the container and will be at least one-half inch in height.

j. ***Barcoding:** The shipment, package, and waste stream identification numbers shall be barcoded according to the following:*

(1) *Code 39*

(2) *Medium to high density, high density preferred.*

(3) *1.0" high barcode.*

- (4) *Human readable interpretation (HRI) 0.50" high printed below the barcode.*
- (5) *Spacing between the barcode and HRI will be 0.10".*
- (6) *Minimum left and right margin (quiet zones) will be*
- (7) *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.*
- (8) *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.*
- (9) *A sample barcode must be submitted to REEC/WMD prior to the first shipment to ensure that REEC/WMD equipment can be used to read the barcode. (NVO-325, Section 5.5.1.3.J)*

Compliance Method: As a low-volume generator (less than 10 shipments per year), barcoding is requested to be provided by REEC/WMD as specified in NVO-325, Section 5.5.1.3.J.9. LANL will contact the WMD at least one month in advance to arrange for the barcodes. Two barcode labels shall be placed on each box, near the top and on opposite sides. Two barcode labels shall be placed on each drum, one on top of the drum lid and one on the side near the top.

- k. On-Site Transfer: *Onsite transfer must be in accordance with NV 54Xg.1A, "NV Radiological Safety Manual," and applicable DOT requirements. For the transfer of unpacked bulk material having external contamination shall be fixed, covered, or contained sufficiently for safe transfer. (NVO-325, Section 5.5.1.3.K)*

Compliance Method: On-site transfer on behalf of LANL will be coordinated with, and performed by, qualified REEC personnel in accordance with NV Order 54XG.1-39, "NV Radiological Safety Manual"; applicable DOT requirements; and any additional requirements as stated in NVO-325.

- 8. Additional Criteria for Mixed Waste - Not Applicable.
- 9. Additional Criteria for Transuranic/Transuranic Mixed Waste - Not Applicable.
- 10. Additional Criteria for Bulk Waste - Not applicable.

11. Additional Criteria for Case-by-Case Waste - Not Applicable.
12. Waste Stream Characterization Data Sheet: Figure 19
13. Three-Year Waste Shipment Forecast: Figure 20
14. Packaging and Shipping Information:
 - a. DOT Proper Shipping Name: Radioactive Material, Low Specific Activity (LSA), n.o.s., Limited Quantity, n.o.s., or _____
 - b. Hazard Class: Radioactive Material
 - c. Hazard Identification Number: UN 2912, UN 2910, or UN _____
 - d. Container Type: Strong, Tight Package or Drums
15. Waste Security Information: None Required

Figure 18
Waste Certification Flow Diagram - LCAB-000000006

WASTE STREAM CHARACTERIZATION DATA SHEET

1. Waste Stream No: LCAB-000000006

2. Waste Description:

a. Physical Characteristics: Laboratory Waste

b. Special Handling/Disposal Requirements: None

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)? No

b. WMIS Nuclide Category (circle): 1 2 3 4 5 6 7 8

c. Radioactive Constituents:

	Nuclide	Specific Activity Range			(Units)
		Low	Mean	High	
(1)	⁴⁵ Nb	<1.0		100	pCi/g
(2)	¹⁰³ Ru	<1.0		100	pCi/g
(3)	⁹⁵ Zr	<1.0		100	pCi/g
(4)	¹⁴¹ Ce	<1.0		100	pCi/g
(5)	¹⁴⁴ Ce	<1.0		100	pCi/g

5. Hazardous Characteristics (for mixed waste): NONE

a. Basis for Identifying as Mixed Waste (circle): (1) Ignitable, (2) Reactive, (3) Corrosive, (4) TCLP, (5) Listed Waste - Not Applicable

b. List all applicable EPA waste code, the chemical name, the treatment performed (if applicable) and the Regulatory/Treatment Standard. Attach Standardized Data Forms. - Not Applicable

Figure 19

Waste Stream Characterization Data Sheet - LCAB-000000006

THREE-YEAR WASTE SHIPMENT FORECAST

GENERATOR

PREPARED BY

DATE

FORECAST PERIOD	WASTE STREAM NUMBER	WASTE TYPE	CONTAINER			NO. OF SHIPMENTS	TOTAL VOLUME
			TYPE	SIZE	WEIGHT		
FY 1992	LCAB-000000006						
10/01 - 12/31							
01/01 - 03/31							
04/01 - 06/30							
07/01 - 09/30							
FY 1993							
FY 1994							

REMARKS

IV. WASTE CERTIFICATION PROGRAM

A. Waste Certification Program Plan

See LANL Low-Level Waste Compliance Plan, Appendix 2.

B. Certification-Related Procedures

Supporting procedures essential to the program are referenced in the LANL Low-Level Waste Compliance Plan and are provided as a part of this Application package (Appendix 4).

V. EXEMPTION REQUESTS

None Required.

VI. PROCEDURES AND SUPPORTING DOCUMENTS

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

LANL Waste Minimization and Pollution Prevention Awareness Plan

LANL Low-Level Waste Compliance Plan

LANL Process Knowledge Plan

LANL certification-related procedures in support of the Low-Level Waste Compliance Plan

VII. REFERENCES

40 CFR 261

49 CFR 172 subparts D and E

49 CFR 173.386

49 CFR 173.421

49 CFR 173.425

49 CFR 173.441

49 CFR 173.443

DOE Order 5480.11 Attachment 2

DOE Order 5820.2A

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

NVO-325

NVO-325 Sec. 5.5.1.1.C

NVO-325 Sec. 5.5.1.1.D

NVO-325 Sec. 5.5.1.3.B

NVO-325 Sec. 5.5.1.3.J.9

NV Order 54XG.1-39 "NV Radiological Safety Manual"

APPENDIX 1

LOS ALAMOS NATIONAL LABORATORY WASTE MINIMIZATION AND POLLUTION PREVENTION AWARENESS PLAN

APPENDIX 2

LOS ALAMOS NATIONAL LABORATORY LOW-LEVEL WASTE COMPLIANCE PLAN

APPENDIX 3

LOS ALAMOS NATIONAL LABORATORY PROCESS KNOWLEDGE PLAN

APPENDIX 4

LOS ALAMOS NATIONAL LABORATORY CERTIFICATION-RELATED PROCEDURES