LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

LLNL-TR-407062

Technical Safety Requirements for the B695 Segment

D. Laycak

September 17, 2008

Disclaimer

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

LLNL-TR-407062

Weapons and Complex Integration
Radioactive and Hazardous Waste Management Division

Technical Safety Requirements for the B695 Segment

September 2008

Lawrence Livermore National Laboratory
Lawrence Livermore National Security, LLC

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. DE-AC52-07NA27344.

Weapons and Complex Integration
Radioactive and Hazardous Waste Management Division

Technical Safety Requirements for the B695 Segment

September 2008

Kerry L Cadwell 9/15/08
Kerry Cadwell, Group Leader
Storage and Disposal Group

John A. Bowers 9/15/8
John Bowers, Group Leader
Waste Treatment Group

James Mecozzi 9/16/08
James Mecozzi, Team Leader
Hazard Control, ES&H Team 1

Concurred by:

M/ Merritt for 9-17-08
Gerald T. Paulson, Associate Director
Nuclear Operations

Approved by:

22 Sept. 2008
Mark W. Martinez, Deputy Principal Associate Director
Weapons and Complex Integration

Lawrence Livermore National Laboratory
Lawrence Livermore National Security, LLC

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLES

INTRODUCTION

This document contains Technical Safety Requirements (TSRs) for the Radioactive and Hazardous Waste Management (RHWM) Division's B695 Segment of the Decontamination and Waste Treatment Facility (DWTF) at Lawrence Livermore National Laboratory (LLNL). The TSRs constitute requirements regarding the safe operation of the B695 Segment. The TSRs are derived from the Documented Safety Analysis (DSA) for the B695 Segment (LLNL 2007). The analysis presented there determined that the B695 Segment is a low-chemical hazard, Hazard Category 3, nonreactor nuclear facility. The TSRs consist primarily of inventory limits as well as controls to preserve the underlying assumptions in the hazard analyses. Furthermore, appropriate commitments to safety programs are presented in the administrative controls section of the TSRs.

The B695 Segment (B695 and the west portion of B696) is a waste treatment and storage facility located in the northeast quadrant of the LLNL main site. The approximate area and boundary of the B695 Segment are shown in the B695 Segment DSA.

Activities typically conducted in the B695 Segment include container storage, lab-packing, repacking, overpacking, bulking, sampling, waste transfer, and waste treatment. B695 is used to store and treat radioactive, mixed, and hazardous waste, and it also contains equipment used in conjunction with waste processing operations to treat various liquid and solid wastes.

The portion of the building called Building 696 Solid Waste Processing Area (SWPA), also referred to as B696S in this report, is used primarily to manage solid radioactive, mixed, and hazardous waste. Operations specific to the SWPA include sorting and segregating waste, lab-packing, sampling, and crushing empty drums that previously contained waste. Furthermore, a Waste Packaging Unit will be permitted to treat hazardous and mixed waste.

RHWM generally processes LLW with no, or extremely low, concentrations of transuranics (i.e., much less than 100 nCi/g). Wastes processed often contain only depleted uranium and beta- and gamma-emitting nuclides, e.g., ^{90}Sr, ^{137}Cs, ^{3}H.

Chapter 5 of the DSA documents the derivation of TSRs and develops the operational limits that protect the safety envelope defined for this facility. The DSA is applicable to the handling of radioactive waste stored and treated in the B695 Segment. Section 5 of the TSR, Administrative Controls, contains those Administrative Controls necessary to ensure safe operation of the B695 Segment. A basis explanation for each of the requirements described in Section 5.5, Specific Administrative Controls is provided in Appendix B. The basis explanation does not constitute an additional requirement, but is intended as an expansion of the logic and reasoning behind development of the requirement. Programmatic Administrative Controls are addressed in Section 5.6.

This introduction to the B695 Segment TSRs is not part of the TSR limits or conditions and contains no requirements related to B695 Segment operations or to the safety analyses in the DSA.

This page intentionally left blank.

SECTION 1
USE AND APPLICATION

1.1 Definitions

The terms defined in **Table 1-1** appear in uppercase type in those specific locations in this report where emphasis is placed on the definition.

Table 1-1. Definition of terms

Term	Definition
APPROVED TRU WASTE CONTAINER	Following is a description of the containers satisfying the free drop test performance criteria for Type A packaging (see 49 CFR 173.465(c)(1) for the applicable package mass) used to store TRU waste in the B695 Segment: • DOT 17C, 17H, or UN1A2, 55-gal (208-L) steel drums with filter vents (waste containers accepted as LLW and converted to TRU WASTE after assay are not required to have vents). • TRUPACT II Standard Waste Boxes (SWBs) refers to oval shaped steel containers with vents, roughly 3-ft H x 6-ft L x 4.5-ft W, designed for efficient loading into TRUPACT II Type B shipping containers. • TRU Oversize Boxes refers to unvented steel containers, rectangular in shape. Built to contain large pieces of contaminated equipment, the dimensions of each TRU oversize box are unique. Heights vary from approximately 53-in to 101-in, widths vary from approximately 47-in to 70-in, and lengths vary from approximately 78-in to 138-in. • Other steel containers with vents satisfying the free drop test performance criteria for Type A packaging (e.g., ten drum overpacks, 85-gal drums).
LOW-LEVEL WASTE (LLW)	Waste containing radioactive components that does not meet the definition of TRANSURANIC (TRU) WASTE.
MAY	Denotes an acceptable, but not required, way to maintain the requirements, assumptions, or conditions of the facility safety basis.
PE-Ci	Plutonium-239 equivalent curie. The Pu-239 equivalent activities of different radionuclides are determined using radionuclide-specific weighting factors, as described in DOE/WIPP-02-3122, Appendix B (DOE 2005-a).
RWSA	Refers to the Radioactive Waste Storage Area, the east end of Building 696.
SHALL	Denotes a mandatory requirement that must be complied with.
SHOULD	Denotes the responsibility of either following the TSR as specified or in a manner that meets the intent of the TSR. The use of "should" recognizes that there may be site- or facility-specific attributes that warrant special treatment and that literal compliance with the TSR may not be required to maintain the requirements, assumptions, or conditions of the facility safety basis.

Term	Definition
SPECIFIC ADMINISTRATIVE CONTROL	An AC that provides a specific preventive or mitigative function for accident scenarios identified in the DSA where the safety function has importance similar to, or the same as, the safety function of a safety SSC (e.g., discrete operator actions, combustible loading program limits, hazardous material limits protecting hazard analyses or facility categorization).
SWPA	Refers to the Solid Waste Processing Area, the west end of Building 696 and truck bay.
TRANSURANIC (TRU) WASTE	Without regard to source or form, waste that is contaminated with alpha-emitting transuranic radionuclides (elements above uranium in the periodic table [i.e., atomic number greater than 92]) with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay.

1.2 Operational Modes

Facility modes are not required since there are no Limiting Conditions for Operations. The facilities will be performing their mission throughout the operational life of the facility. RHWM has determined that this section is not applicable to the B695 Segment. It was retained for consistency with the TSR numbering system.

1.3 Frequency Notation

Table 1-2. Frequency notation

Notation	Frequency*	No frequency interval to exceed these values**
Weekly	At least once every 7 days	9 days
Monthly	At least once every 31 days	39 days
Quarterly	At least once every 92 days	115 days
Semiannually	At least once every 184 days	230 days
Annually	At least once every 365 days	456 days
Every 5 years	At least once every 60 months	72 months
Every 10 years	At least once every 120 months	150 months

* Times are elapsed times, not workdays.

** Values represent 1.25 times the specific interval. Values are intended to provide operational flexibility for completion of surveillances, but should not be relied on as a routine extension of a specified interval.

1.4 Abbreviations and Acronyms

Table 1-3 identifies the abbreviations and acronyms used in this TSR.

Table 1-3. Abbreviations and Acronyms

Abbreviation or Acronym	Definition
AC	Administrative Control
CFR	Code of Federal Regulations
Ci	Curies
CM	Configuration management
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DSA	Documented Safety Analysis
DWTF	Decontamination and Waste Treatment Facility
EPD	Environmental Protection Department
ES&H	Environment, Safety, and Health
FGE	Fissile gram equivalent
FPOC	Facility Point of Contact
FSP	Facility Safety Plan
HC	Hazards Control
ISMS	Integrated Safety Management System
LCO	Limiting condition for operation
LLNL	Lawrence Livermore National Laboratory
LLNS	Lawrence Livermore National Security
LLW	Low-level waste
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
PC-2	Performance Category 2
PE-Ci	Plutonium equivalent curie
QA	Quality assurance
RHWM	Radioactive and Hazardous Waste Management
RWSA	Radioactive Waste Storage Area
SAC	Specific Administrative Control
SL	Safety limit
SR	Surveillance requirement
SSCs	Structures, systems, and components
SWB	Standard waste box
SWPA	Solid Waste Processing Area
TRU	Transuranic
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question

Abbreviation or Acronym	Definition
WCI	Weapons and Complex Integration

1.5 Safety Limits

No Safety Limits (SL) have been identified as necessary to support the safety analysis for the B695 Segment; therefore, none have been included in this TSR. Although SLs are not applicable, this section has been retained for consistency with the TSR numbering system.

1.6 Limiting Control Setting

Operation of the B695 Segment includes no SLs; therefore, Limiting Control Settings are not applicable. This section was retained for consistency with the TSR numbering system.

1.7 Limiting Conditions for Operation

No Limiting Conditions for Operation (LCOs) have been identified as necessary to support the safety analysis of the B695 Segment DSA; therefore, none have been included in this TSR. This section was retained for consistency with the TSR numbering system.

1.8 Surveillance Requirements

No Surveillance Requirements (SRs) have been identified as necessary to support the safety analysis of B695 Segment DSA; therefore, none have been included in this TSR. This section was retained for consistency with the TSR numbering system.

SECTION 2
SAFETY LIMITS

Applying the significance criteria and methodology based on 10 CFR 830 did not result in identifying systems, components, or parameters that require SLs. Because no SLs were identified for the B695 Segment, the SL applicability criteria and associated bases are not included in this TSR.

This page intentionally left blank

SECTION 3/4
LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

3/4.1 General Application

There are no limiting conditions for operations (LCOs) or related surveillance requirements (SRs).

This page intentionally left blank

SECTION 5
ADMINISTRATIVE CONTROLS

5.1 Contractor Responsibility

The RHWM Division Leader/Deputy Division Leader SHALL be responsible for overall facility operation and SHALL delegate in writing the succession of this responsibility to a qualified individual during each absence.

5.2 Contractor Organization

5.2.1 Site Organization

The management team of LLNS, LLC operates and maintains nuclear facilities in a safe, secure, and compliant manner to effectively achieve Laboratory mission objectives. Each of these facilities is managed under a matrix organization. Weapons and Complex Integration (WCI) has line responsibility. They execute the scope, manage the budget and schedule, and provide day to day direction of the facility managers assigned to Nuclear Operations. The nuclear facility managers are matrixed from Nuclear Operations into the WCI principal directorate. In this role, they are accountable to the Nuclear Material Technology Deputy Principal Associate Director for the safe and compliant operation of the facility.

5.2.2 Facility Organizations

The RHWM Storage and Disposal Group and Waste Treatment Group Leaders are responsible for B695 and B696S facility operation functions. The group leaders are responsible for overall site safety and have control over those activities necessary for safe operation and maintenance of the B695 Segment.

The Facility Point of Contact (FPOC) for B695 is the Waste Treatment Nuclear Operations Supervisor, and the FPOC for B696S is the RHWM Storage and Disposal Nuclear Operations Supervisor. Some of the FPOC responsibilities include concurring that work can be safely performed in the facility, identifying hazards associated with the work location and communicating them to the responsible work management chain, participating in pre-start review of work (when one is conducted), evaluating proposed operational or activity changes against the facility's existing ES&H documentation (e.g., the safety basis), and concurring that work can proceed in the building, prior to the onset of work.

5.3 Procedures

B695 Segment Facility Safety Plans (FSPs) are developed to ensure that facilities and operations are managed in a manner that safeguards workers and protects the environment. In addition, RHWM maintains operational procedures that provide additional instruction to help ensure safe operation of the facility. FSPs and RHWM procedures that affect safety at the B695 Segment are fully reviewed by

management and the ES&H Team, and are signed and dated by the reviewers. Distribution is maintained on a web server so that only approved documents are available.

5.4 Technical Safety Requirements

5.4.1 General

The TSR SHALL be prepared, reviewed independently, and approved in accordance with 10 CFR 830, Subpart B.

5.4.2 Compliance

The TSRs SHALL be complied with, except for reasonable action taken in an emergency (see Section 5.4.6). RHWM management is responsible for ensuring that the requirements of these TSRs are met. Compliance SHALL be demonstrated by establishing, implementing, and maintaining the required Administrative Controls (ACs) and AC Programs.

5.4.3 Violation of TSRs

Violation of a TSR can occur as a result of four circumstances:

- Exceeding a safety limit.
- Failure to complete an action statement within the required time limit after exceeding an LCS or failing to comply with an LCO.
- Failure to perform a surveillance within the required time limit.
- Failure to comply with an AC statement.

Because only ACs are specified for the B695 Segment, only the last condition applies.

5.4.4 Violation of an Administrative Control

Failure to comply with the specific ACs in Section 5.5 constitutes a TSR violation. For the programmatic ACs listed in Section 5.6, violation occurs when the failure is of sufficient magnitude that the intent of the referenced program is not fulfilled. The U.S. Department of Energy (DOE) SHALL have the right, in consultation with RHWM facility management, to determine if a particular noncompliance will be considered a TSR violation.

5.4.5 Response to an Administrative Control Violation

For all TSR and AC Program failures, the following responses apply:

- Evaluate and if necessary, place the facility in a safe condition.
- Notify DOE of the violation in accordance with applicable LLNL procedures and DOE orders and regulations.

- Prepare an Occurance Report in accordance with applicable LLNL procedures and DOE orders and regulations.
- Carry out the corrective actions to comply with the AC Program.

5.4.6 Emergency Actions

Emergency actions MAY be taken that depart from a requirement in the TSR, provided that:

- An emergency situation exists.
- The actions are needed immediately to protect public health and safety.
- No action consistent with the TSR can provide adequate or equivalent protection.

Such emergency actions SHALL be authorized by the facility manager, designee, or incident commander and performed by personnel trained and qualified for the equipment or systems needed to perform the actions. If an emergency action is taken, both verbal notification and a written report SHALL be made within 24 hours to the DOE Livermore Site Office Manager or designee.

5.5 Specific Administrative Controls

This section establishes nonprogrammatic Specific Administrative Control (SACs) committed to in the B695 Segment DSA, which preserve critical assumptions in the safety analyses. Table 5-1 lists the SACs for the B695 Segment:

Table 5-1. Directive Action Specific Administrative Controls

Facility Nuclear Inventory Limits
• The total radioactive material inventory SHALL be no greater than 56 PE-Ci and the fissile material inventory SHALL be no greater than 450 Pu-239 fissile gram equivalent (FGE).
• The radioactive content of waste material in each APPROVED TRU WASTE CONTAINER SHALL be no greater than 50 PE-Ci and the fissile material inventory SHALL be no greater than 200 FGE based on Acceptable Knowledge. The amount of radioactive material SHALL be administratively controlled consistent with the National Environmental Policy Act (NEPA) limits.
Facility Nuclear Storage and Handling Limits
• All TRU WASTE SHALL be stored in APPROVED TRU WASTE CONTAINERS.
• TRU WASTE stored in APPROVED TRU WASTE CONTAINERS SHALL not be stacked more than two levels high. APPROVED TRU WASTE CONTAINERS exceeding a nominal height of 4-feet SHALL not be stacked.
• TRU WASTE SHALL not be staged outside the building for more than 36 hours

5.6 Programmatic Administrative Controls

This section establishes programmatic ACs committed to in the B695 Segment DSA.

5.6.1 Configuration Management Program

A configuration management program SHALL be established, implemented, and maintained to ensure consistency between the appropriate design requirements, physical configuration, and documentation of SSCs necessary to protect workers and the public as described in Document 41.2, "Configuration Management Program Description," in the ES&H Manual. This program includes designated system engineers. The USQ process is performed in accordance with the LLNL Unreviewed Safety Question process.

5.6.2 In-service Inspection & Test, and Maintenance Programs

An in-service inspection & test program including initial testing, and a maintenance program SHALL be established, implemented, and maintained to ensure the integrity of the Design Features in Section 6. Inspections, tests, and maintenance SHALL be performed by qualified personnel. Inspections, tests, and maintenance are described in Chapter 10 of the DSA.

A TRU waste container maintenance program SHALL be established, implemented, and maintained to preserve container integrity of the Design Features in Section 6. This program includes the following:

- Upon acceptance, visually verifying that vents are present on all APPROVED TRU WASTE CONTAINERS, except TRU oversize boxes and LLW converted to TRU WASTE after assay.
- If a TRU waste container is dropped, it will be inspected, and overpacked if necessary, as soon as the appropriate safety precautions can be implemented, but at least within one working day of the drop.
- Weekly inspection of container integrity to include checks for rusting, corrosion, damage, denting, swelling, and damage to filter vents.
- Quarterly monitoring of the dimensions of unvented TRU waste containers for bulging.

This program is implemented through the FSP and RHWM procedures.

A building structure inspection program SHALL be established, implemented, and maintained to ensure that B695 and B696S meet the applicable DOE PC-2 requirements. This program includes inspections every five years or less by a qualified engineer (e.g., structural or civil) to verify that significant physical deterioration of the structural system has not occurred. The partition between B696R and the B696 Solid Waste Processing Area (B696S) is inspected every five years to ensure it maintains its fire rating. Any deficiencies identified will be evaluated for potential impact on stored TRU WASTE containers and repaired when approved. This program is implemented through the FSPs and RHWM programs or procedures.

5.6.3 Emergency Preparedness Program

An emergency preparedness program SHALL be established, implemented, and maintained to ensure that all RHWM personnel react appropriately to emergencies, whether local or site-wide. This program is implemented in *ES&H Manual* Document 22.1, "Emergency Preparedness and Response," and in the RHWM Contingency Plan (LLNL-e latest revision). This program includes personnel response procedures, evacuation routes, etc. LLNL's *Emergency Plan* addresses necessary long-term response activities and offsite actions. The FSP and RHWM Contingency Plan address short-term response actions that are the responsibility of the RHWM Division. The Emergency Preparedness Program is discussed in detail in Chapter 15 of the DSA.

5.6.4 Hazardous Material Protection Program

A hazardous material protection program SHALL be established, implemented, and maintained to ensure that exposures to employees, subcontractors, visitors, and members of the general public are controlled in accordance with the LLNL Hazardous Materials Protection Program, as implemented in *ES&H Manual* Document 14.1, "LLNL Chemical Safety Management Program." The Hazardous Materials Protection Program is discussed in detail in Chapter 8 of the B695 Segment DSA.

5.6.5 Radiation Protection Program

A radiation protection program SHALL be established, implemented, and maintained to ensure that radiation exposure to employees, subcontractors, and visitors is controlled in accordance with requirements of 10 CFR 835, as implemented in *ES&H Manual* Document 20.5, "Occupational Radiation Protection: Implementation of 10 CFR 835." The relationship of facility-specific radiation protection controls to the LLNL Radiation Protection Program is defined in Chapter 7 of the B695 Segment DSA. The following facility-specific controls, resulting from the DSA hazards analysis, are encompassed by the Radiation Protection Program:

- Respirators for the worker are required whenever a process batch exceeds 0.52 PE-Ci, e.g., small scale treatment, chopper, and shredder operations.

The Radiation Protection Program is discussed in detail in Chapter 7 of the B695 Segment DSA.

5.6.6 Fire Protection Program

A fire protection program SHALL be established, implemented, and maintained to minimize the likelihood of fire in accordance with all contractor-applicable provisions of DOE Order 420.1A as implemented in *ES&H Manual* Document 22.5, "Fire," and in the FSP. The Fire Protection Program is discussed in detail in Chapter 11 of the DSA. Key provisions of this program include:

- Combustible loading is limited to an average of 7 pounds of equivalent ordinary combustibles per square foot in fire areas storing TRU WASTE and in B696S Room 1009 for segmentation, excluding waste containerized in metal packaging.
- Only non-combustible pallets are used for storing TRU WASTE containers.

- Maintenance of a 20-ft separation between the B695 Segment and other nuclear segments, with the exception of B696R and B696S, which are separated by a fire-resistive partition. In addition, the separation (e.g., fire lane) is expanded between adjacent rollup doors in B696 near the segment boundary to prevent fire from impacting both segments through adjacent rollup doors.
- Inspection, maintenance, and testing of fire suppression systems are based on applicable NFPA requirements.
- Forklifts are not fueled inside B695 or B696S. (Note: This TSR does not prohibit the use of propane, diesel, or gasoline-powered vehicles).

5.6.7 Traffic Control Program

A traffic control program SHALL be established, implemented, and maintained to provide protection from vehicular traffic for TRU WASTE in the yard. The traffic control program is intended to limit the speed of vehicles while in the yard and includes speed limits posted in the yard and vehicles required to stop at the yard gate before entering. This program is implemented through the FSP and discussed in Chapter 11 of the DSA.

5.6.8 Training Program

The training program provides appropriate instructional support to enable B695 Segment workers to develop and maintain competencies for successfully executing work assignments. *ES&H Manual* Document 40.1, "LLNL Training Program Manual," provides guidance for developing and managing individual directorate training programs. The Training Program is discussed in detail in Chapter 12.

5.6.9 Criticality Safety Program

A criticality safety program SHALL be established, implemented, and maintained in accordance with *ES&H Manual* Document 20.6, "Criticality Safety" to ensure that all B695 Segment operations and activities are reviewed, evaluated, and documented by the LLNL Criticality Safety Division in accordance with the contractor-applicable portions of DOE Order 420.1A. Any detailed controls SHALL be documented in the B695 Segment FSP. The Criticality Safety Program is discussed in Chapter 6 of the DSA.

5.7 Minimum Staffing Requirements

The B695 Segment normally operates on a single work shift, with working hours in the range of 7:00 a.m. to 6:00 p.m. Working hours can be extended to complete a given operation. The Facility Manager determines minimum staffing requirements for operating and maintaining the facility. At a minimum, two persons are required for movement of waste if self-rescue cannot be performed, or when waste treatment processes are being conducted. However, only one person is required to initiate process equipment operation. A single person MAY perform inspections and maintenance. No personnel are required for storage.

5.8 Operating Support

The Hazards Control Department ES&H Team provides technical support for radiation safety, fire protection, industrial hygiene, industrial safety, and environmental analysis. An ES&H Team Health & Safety Technician SHALL be on site when work is being performed and SHALL be on call at all other times when radioactive material is present in the B695 Segment. For emergencies (in case of accidents involving radioactive material) after normal working hours, emergency response personnel are to be contacted by calling 911. In the event of an emergency, additional LLNL support can be provided as part of the Emergency Preparedness Program.

5.9 Facility Staff Qualifications and Training

A training program SHALL be established, implemented, and maintained to ensure that personnel responsible for RHWM operations are trained and qualified, as applicable, to perform their assigned responsibilities safely. This program includes forklift and crane operators who handle waste containers or who operate a forklift or crane in the vicinity of waste containers. Such personnel SHALL be trained and licensed in accordance with LLNL requirements, with specific reference to safe practices for lifting and handling waste containers. Workers SHALL be trained in emergency response, which includes instructions to evacuate the building immediately in case of fire. The *Training Implementation Matrix for the Radioactive and Hazardous Waste Management Division* (LLNL-b latest revision) addresses the requirements of DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*. The Training Program is discussed in detail in Chapter 12 of the DSA for the B695 Segment.

5.10 Operability Definition and Implementation Principles

RHWM has determined that this section is not applicable to the B695 Segment. It was retained for consistency with the TSR numbering system.

5.11 Reviews and Audits

Facility staff perform reviews to ensure that day-to-day activities are conducted in a safe manner. Such reviews are described in the *Inspection Schedule and Guidance for Waste Treatment* (LLNL-c latest revision) and *Inspection Schedule and Guidance for Storage and Disposal Group and Waste Generator Services Group* (LLNL-f latest revision) plans. Appendices in the *Inspection Schedule and Guidance Plan* are updated periodically. Individual reviewers do not review their own work for which they have direct responsibility. Technical review, audit, and self-assessment of facility activities and programs that affect safety are performed independent of the facility staff by Hazards Controlt safety and health professionals.

Written records of facility reviews, technical reviews, audits, and assessments SHALL be maintained in accordance with the Quality Assurance (QA) Program. In conjunction with the QA Program and the Integrated Safety Management System (ISMS), Configuration Management (CM) ensures that LLNL achieves its safety goal. The *RHWM Nuclear Facility Configuration Management Program* (LLNL-d latest revision), including the USQ process and QA Program, provide a systematic process for assuring the status of facility safety basis requirements, and maintaining the appropriate descriptive

documentation. The CM Program implements a graded approach, applying greatest rigor to management of configuration items whose failure poses the greatest risks.

5.12 Reporting Requirements

Events and conditions that violate TSR AC Programs, as defined in Section 5.4.3 and 5.4.4 above, are considered Occurrences. Occurrences SHALL consistently be reported to ensure that both the DOE, including the Office of the Secretary, and LLNL line management are kept fully and currently informed of all events that could (1) affect the health and safety of the public; (2) seriously impact the intended purpose of DOE facilities; (3) have a noticeable adverse effect on the environment; or (4) endanger the health and safety of workers. A system SHALL be established for determining appropriate corrective action and for ensuring that such actions are effectively taken. Reporting is implemented in *ES&H Manual* Document 4.3, "LLNL Implementation Procedure for Reporting Occurrences to DOE." Occurrence reports SHALL be reviewed and approved by LLNL line management.

SECTION 6
DESIGN FEATURES

The following passive SSCs, as described in Chapter 4 of the DSA for the B695 Segment and designated as safety-significant SSCs, are specified as TSR design features:

- Approved TRU waste containers satisfy the free drop test performance criteria for Type A packaging (see 49 CFR 173.465(c)(1) for the applicable package mass), and are fitted with vents, vent clips, or similar devices where applicable.
- The B695 and B696S structural systems and significant appurtenances (i.e., crane restraints) are designed and maintained to PC-2 criteria (e.g., seismic and wind).
- The partition between B696R and B696S is a fire-resistive structure as described in Section 4.4.3.2 of the B695 Segment DSA. The partition reduces the likelihood of fire propagation between B696R and B696S.

These design features SHALL be controlled to maintain their design (as specified in applicable design drawings and specifications) as of the effective date of this TSR. Modifications or replacements SHALL maintain the same design features and functions as the original, including materials, methods of construction, physical dimensions, and other parameters specified in applicable industry codes and standards, unless engineering analysis demonstrates equivalency.

This page intentionally left blank

SECTION 7
REFERENCES

DOE (2005-a), *Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-02-3122, U.S. Department of Energy, Carlsbad Field Office (April 25, 2005).

DOE (2005-b), *Final Site-wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management*, March 2005 (DOE/EIS-0348, DOE/EIS-0236-S3).

FR (2005), *Record of Decision of the Final Site-Wide Environmental Impact Statement for Continued Operation of Lawrence Livermore National Laboratory and Supplemental Stockpile Stewardship and Management Programmatic Environmental Impact Statement*, November 29, 2005 (Federal Register/ Vol. 70, No. 228).

LLNL (2007), *Documented Safety Analysis for the B695 Segment of the Decontamination and Waste Treatment Facility*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-AR-149550, Rev. 3, February 2008.

LLNL-a (latest revision), *Environment, Safety and Health Manual*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-MA-133867.

LLNL-b (latest revision), *Training Implementation Matrix for the Radioactive and Hazardous Waste Management Division*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-AR-116655.

LLNL-c (latest revision), Inspection Schedule and Guidance; Waste Treatment Group; Daily, Weekly, and Daily "When-In-Use" Inspections of Radioactive and Hazardous Waste Management Facilities at Lawrence Livermore National Laboratory, Lawrence Livermore National Laboratory, Livermore, CA.

LLNL-d (latest revision), *RHWM Nuclear Facility Configuration Management Program*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-AR-151576.

LLNL-e (latest revision), *Contingency Plan for Hazardous Waste Management Facilities: Area 612, Area 514, Building 233 CSU, and the Decontamination and Waste Treatment Facility*, Lawrence Livermore National Laboratory, Livermore, CA (UCRL-AR-127066-02).

LLNL-f (latest revision), Inspection Schedule and Guidance; Storage and Disposal Group and Waste Generator Services Group; Daily, Weekly, and Daily "When-In-Use" Inspections of Radioactive and Hazardous Waste Management Facilities at Lawrence Livermore National Laboratory and Site 300, Lawrence Livermore National Laboratory, Livermore, CA.

NNSA/LLNS (2007), Management and Operating Contract between The US Department of Energy/National Nuclear Security Administration and Lawrence Livermore National Security, No. DE-AC52-07NA27344, October 1, 2007.

This page intentionally left blank

APPENDIX A
SL AND LCO BASES

Because no safety limits (SLs) or limiting conditions for operation (LCOs) have been identified as necessary to support the safety analysis of the RHWM, no bases explaining the reasons for such requirements have been included in this TSR. The heading of Appendix A was retained for consistency with the numbering system used to identify TSR sections.

This page intentionally left blank

APPENDIX B
BASES FOR SPECIFIC ADMINISTRATIVE CONTROLS

Bases of SACs

This appendix contains a summary of administrative controls for the B695 Segment that perform a specific preventive or mitigative function for the accident scenarios in the DSA. The safety function of these administrative controls has importance similar to the safety function of a safety SSC. The SACs are judged to provide significant preventive or mitigative functions for potential accident scenarios or are identified as initial condition assumptions used in the unmitigated and mitigated consequence evaluation in the hazard analysis. This description is provided so that the B695 Segment operations staff knows the exact conditions that have to be met and the associated basis.

This appendix is divided into two main sections, SACs related to inventory and SACs related to storage and handling and contains three sections for each SAC: Critical Safety Function, Control Description, and Basis.

B.1 Facility Inventory Limit

B.1.1 Critical Safety Function

The facility inventory limits are initial condition assumptions for the hazard analysis described in Chapter 3 of the DSA. These SACs protect the assumptions and ensure:

- that the consequences determined in the hazard analysis are not invalidated by placing the facility in formally unanalyzed space,
- that the facility inventory remains below the threshold for HC-2 facilities as established in DOE-STD-1027, Change Notice No. 1 and
- that an inadvertent criticality event is not credible and is precluded.

B.1.2 Control Description

- The total radioactive material inventory SHALL be no greater than 56 PE-Ci and the fissile material inventory SHALL be no greater than 450 Pu-239 fissile gram equivalent (FGE).

B.1.3 Basis

To maintain the facility as a HC-3 nuclear facility, as defined by DOE-STD-1027-92, the radionuclide inventory in the facility must never exceed the quantity of any one of those specified in Attachment 1 of the DOE standard, nor shall the inventory exceed a combination of radionuclides such that the sum of ratios methodology described in the standard exceeds unity. The facility inventory limit is based on the

limit specified in the standard for Pu-239 (i.e., 56 curies). Pu-239 equivalency for each non-Pu-239 radionuclide entering the facility is established by a comparison of its inhalation dose hazard relative to that of Pu-239. This process is described in the B695 Segment DSA, Appendix C.

The threshold value for fissile material is specified in DOE-STD-1027-92 and described as the minimum theoretical mass necessary for a nuclear criticality to occur with moderation and reflection. The value for an aqueous solution of Pu-239 is approximately 450 grams and is the most limiting of the fissile nuclides listed. By limiting the fissile mass allowed in the B695 Segment to less than 450 FGE, inadvertent criticality is not credible and is precluded.

B.2 TRU Waste Container Inventory Limit

B.2.1 Critical Safety Function

The radioactive and fissile material container inventory limits are assumed conditions for the hazard analysis performed in the B695 Segment DSA for scenarios involving TRU WASTE containers, and serve to limit the radioactive material that can be impacted in accident scenarios. The inventory limits protect these assumptions and ensure that the consequences determined in the process hazards analysis remain bounding.

B.2.2 Control Description

- The radioactive content of waste material in each APPROVED TRU WASTE CONTAINER SHALL be no greater than 50 PE-Ci and the fissile material inventory SHALL be no greater than 200 FGE based on Acceptable Knowledge. The amount of radioactive material SHALL be administratively controlled consistent with the National Environmental Policy Act (NEPA) limits.

B.2.3 Basis

The container limit of 50 PE-Ci was an initial condition for containerized radioactive material accident scenarios in the hazard analysis presented in the B695 Segment DSA. 50 PE-Ci per TRU WASTE container was analyzed in the hazard analysis to provide bounding consequences and is established as the inventory limit. The current LLNL Environmental Impact Statement (DOE 2005-b; FR 2005) assumes an inventory of 12 PE-Ci per APPROVED TRU WASTE CONTAINER in the DWTF. Therefore, inventory is controlled at lower limits for consistency with the current NEPA container limits. The NEPA limits are not derived from the requirements, assumptions, or conditions of the facility safety basis. The limit of 200 FGE ensures that a criticality event involving a container is not credible.

B.3 TRU Waste Container

B.3.1 Critical Safety Function

APPROVED TRU WASTE CONTAINERS provide a confinement function limiting worker exposures and radioactive waste vulnerability in accident scenarios involving containerized TRU WASTE.

B.3.2 Control Description

- All TRU WASTE SHALL be stored in APPROVED TRU WASTE CONTAINERS

B.3.3 Basis

APPROVED TRU WASTE CONTAINERS satisfy the free drop test performance criteria for Type A packaging [see 49 CFR 173.465(c)(1) for the applicable package mass]. These containers are vented, with the exception of TRU Oversize Boxes and LLW/TRU conversions. Venting drums minimizes the potential for hydrogen gas buildup. Regarding TRU Oversize Boxes, tests have demonstrated that hydrogen buildup in the boxes is well below the lower flammability limit. The unvented containers are inspected regularly.

B.4 Stacking Heights

B.4.1 Critical Safety Function

Stacking height limitations prevent loss of confinement of TRU WASTE stored in APPROVED TRU WASTE CONTAINERS due to containers falling from heights in excess of design specifications.

B.4.2 Control Description

- TRU WASTE stored in APPROVED TRU WASTE CONTAINERS SHALL not be stacked more than two levels high. APPROVED TRU WASTE CONTAINERS exceeding a nominal height of 4-feet SHALL not be stacked.

B.4.3 Basis

This was identified in seismic scenarios as a mitigative control. Containers satisfying the free drop test performance criteria for Type A packaging [see 49 CFR 173.465(c)(1)] are used to store TRU WASTE. Such containers are designed to survive at least a 4-ft drop consistent with their Type A packaging performance criteria. Ten drum overpacks are approximately 6-ft in height and therefore, are not stacked.

B.5 TRU WASTE Staging

B.5.1 Critical Safety Function

Staging time limitations minimize the potential for a vehicle collision with staged TRU WASTE containers.

B.5.2 Control Description

- TRU WASTE SHALL not be staged outside the building for more than 36 hours

B.5.3 Basis

The probability of a vehicle collision with staged waste increases with the amount of time the waste remains outside the building. It is assumed that limiting the time TRU WASTE is allowed to be staged outside to 36 hours will reduce the probability of such a collision.