Description of document:	National Nuclear Security Administration (NNSA) safety plan for conducting subcritical experiments such as the NIMBLE series or the RED SAGE series 2020
Requested date:	26-October-2022
Release date:	22-June-2023
Posted date:	03-July-2023
Source of document:	FOIA request NNSA/Office of the General Counsel P.O. Box 5400 Albuquerque, NM 87185 Fax: (505) 284-7512 NNSA FOIA Request Form Email: FOIOfficer@nnsa.doe.gov

National Nuclear Security Administration

Department of Energy
National Nuclear Security Administration
Office of the General Counsel
P. O. Box 5400
Albuquerque, NM 87185

June 22, 2023

SENT VIA EMAIL

This letter is the final response to your October 25, 2022, Freedom of Information Act (FOIA) request.

Your request stated the following:

A copy of the safety plan for conducting "subcritical" experiments such as the NIMBLE series and the RED SAGE series.

Your request was received in our office on October 26, 2022. Upon receipt, we contacted the National Nuclear Security Administration's (NNSA) Nevada Field Office (NA-NV), oversight for the Nevada National Security Site (NNSS), about your request. NA-NV also asked their Management and Operating (M&O) contractor Mission Support and Test Services, LLC (MSTS) to conduct a search for responsive records. NA-NV and MSTS conducted a comprehensive search of their records.

The following responsive record was located:

Document 1: U1A-SCE-TSR-001, 118 pgs.

The enclosed document is being provided with redactions pursuant to 5 U.S.C. § 552(b)(7)(E), Exemption 7 of the FOIA.

Exemption 7(E) of the FOIA provides protection for all information compiled or for law enforcement purposes when release would disclose techniques and procedures for law enforcement investigations or prosecutions or would disclose guidelines for law enforcement investigations or prosecutions if such disclosure could reasonably be expected to risk circumvention of the law. The term "law enforcement" can include activities associated with preventing breaches to national security.

The information withheld pursuant to Exemption 7(E) is of mass amounts or extrapolation by dose potentially used in Subcritical Experiments (SCE), and the description of location of the Zero Room, the experiment insertion path, and the temporary location of Special Nuclear Material (SNM). This information, if released is directly related to national security law enforcement efforts in protecting and deterring unauthorized access to the nation's special nuclear and radiological materials and deterring nuclear or radiological proliferation threats against the U.S. government and citizens. Access to this information would allow individuals, whether U.S. citizens or foreign nationals, the knowledge to recreate the SCE, develop a radiological weapon, and provide them with information regarding the possible location of SNM, which could be used to further the development of radiological weapons. Lastly, release of this information would put security of the NNSS and the American public at risk and the safety of all humanity could be damaged, injured, or killed by an individual utilizing this information.

The Department of Energy (DOE) regulations 10 CFR § 1004.1 provides that documents exempt from mandatory disclosure under the FOIA shall be released regardless of their exempt status, unless DOE determines that disclosure is contrary to public interest. For the reasons described above, NNSA has determined that release of the information described above is not in the public interest.

Pursuant to 10 CFR § 1004.7(b)(2), I am the individual responsible for the withholding of the information mentioned above pursuant to Exemption 7E of the FOIA.

You may appeal the withholding of information pursuant to 10 CFR § 1004.8. Such an appeal must be made in writing within 90 calendar days after receipt of this letter, addressed to the Director, Office of Hearings and Appeals, HG-1, U.S. Department of Energy, 1000 Independence Avenue SW, L'Enfant building, Washington, DC 20585. Your appeal must contain a concise statement of the grounds for the appeal and a description of the relief sought. **Please submit a copy of this letter with the appeal** and clearly mark both the envelope and the letter "Freedom of Information Appeal." You may also submit your appeal by email (preferred method) to OHA.filings@hq.doe.gov, including the phrase "Freedom of Information Appeal" in the subject line. Thereafter, judicial review will be available to you in the District of Columbia or in the district where (1) you reside, (2) you have your principal place of business, or (3) the Department's records are situated.

You may also contact me, NNSA's FOIA Public Liaison, Office of the General Counsel, at 1-866-747-5994, or by mail to Department of Energy, National Nuclear Security Administration, Office of the General Counsel, PO Box 5400, Albuquerque, NM 87185, for further assistance and to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows: Office of Government Information Services, National Archives and Records Administration, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001, e-mail at ogis@nara.gov; telephone at (202) 741-5770; toll free at 1-877-684-6448; or facsimile at (202) 741-5769.

There are no fees chargeable to you for processing this request. If you have questions, please contact Ms. Delilah Perez by e-mail at Delilah.Perez@nnsa.doe.gov, or write to the address above. Please reference Control Number FOIA 23-00012-M in your communication.

Sincerely,

Christina H. Hamblen
Digitally signed by Christina H. Hamblen
Date: 2023.06.22 14:33:23 -06'00'

Christina H. Hamblen
FOIA Officer

Enclosure

Nevada National Security Site

U1a Complex
Subcritical Experiments
Technical Safety Requirements

U1a-SCE-TSR-001
Revision 3
Change Notice 1

January 2020

Prepared for the U.S. Department of Energy,
National Nuclear Security Administration Nevada Field Office
Contract No. DE-NA0003624

Prepared by Mission Support and Test Services, LLC

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HISTORY OF REVISIONS

Rev. No.	Description of Change	Affected Pages	Date Approved
0	Initial Issue	All	4/30/2009
1	Full Revision	All	
1 CN1	Remove JNPO Criticality Program replace with NSTec Criticality program and revise Radiation Protection SMP.	ix, 5-10, 5-11	
1 CN2			-
0	General change to convert the Barolo specific document to a generic U1a SCE document for SCEs involving HC-3 material quantities. Change document number from JNPO-BAR-TSR-001 to U1a-SCE-TSR-001 and issue as Revision 0.	All	3/30/2012
1	(1) Upgrade U1a Complex nuclear segment to HC-2 from present HC-3 designation, (2) general changes to include new (b) (7)(E) access and Plug #2 to the (b) (7)(E) Zero Room to accommodate SCE vessels up to 6 ft in diameter, and new entombment area in (b) (7)(E) (b) (7)(E) (3) revise description of nuclear criticality safety, (4) remove HEPA filters as a SS-SSC, (5) add new SACs, (6) remove control of energy sources during discrete activities and fielding coordinator walkdown as administrative controls, (7) remove reference to Step Wedge and replace with more general terminology, (8) address Uncontrolled Rapid Descent Hoist Scenario PISA submitted as ORPS #NA--NVSO-NST-NTS-2016-0011, and (9) Annual Update of DSA. Item (1) addresses PISA submitted as ORPS #NA--NVSO-NST-NTS-2014-0017, with associated positive USQD #U1a-14-5120-D.	All	11/21/2016
1 CN1	Incorporate Conditions of Approval identified in NNSA/NFO approval letter dated November 21, 2016, BCC-17007, and Safety Evaluation Report (SER), AMSS-SER-2017-001, Revision 0, November 2016. Revisions are identified by track change bars on the affected pages. Add FIREWATCH and TRANSIENT COMBUSTIBLES to definitions list. Add surveillance requirements to LCO 3.1.1 and to corresponding Bases. Update the Background Summary in Bases.	1-3, 1-5 3/4.1-2, A3/4 1-1, A3/4 1-2, A3/4 1-3	03/15/2017

(continued)

HISTORY OF REVISIONS (continued)

Rev. No.	Description of Change	Affected Pages	Date Approved
1 CN1	Correct a table number in LCO 3.1.3 and the corresponding Bases. Update reference in the Bases.	3/4.1-7, A3/4 1-13, A3/4 1-15	03/15/2017
	Add Section 3.1.4 for Secured Zero Room Configuration and add the corresponding Bases.	3/4.1-10, A3/4 1-16, A3/4 1-17	
	Add introductory description to Section 5.6 and add Emergency Preparedness Program and Maintenance Management Program.	5-9, 5-10	
	Update Sections 5.7.5, 5.7.6, and 5.7.8.	5-12, 5-13	
	Delete Sections 5.7.17 and 5.7.18 and update Section 5.7.20.	5-14, 5-15	
	Update Section 6.3.2 and Tables 6-1, 6-2, and 6-5.	6-3, 6-5	
2	Updated M&O Contractor on Cover Sheet.	Cover Page	09/12/2018
	Added current M&O Contractor to Acronyms and Abbreviations List.	xii	
	Changed "or other hazardous materials" to "and hazardous materials."	1-1	
	Removed "slows and/or" in SR 4.1.1.2.	3/4.1-2	
	Added "and within its SECURED SHIPPING CONTAINER" to LCO 3.1.3 ACTION A and modified Required Actions A.1.1, A.1.3, B.1.1, B.1.3, C.1.2, and C.1.3 to add "remove TRANSIENT COMBUSTIBLES."	3/4.1-4, 5, 6, 8	
	Added "or Staging Stand" to approved location in Table 3.1.3-1.	3/4.1-9	
	Added new Section 3.1.5, Severe Weather Restriction.	3/4.1-11, 12	
	Deleted Sections 5.2.1 and 5.2.2.	5-2	
	Modified T&F definition in Section 5.2.3.	5-3	
	Modified Item 4.a in Section 5.3.3.	5-5	
	Deleted "still" from bullets under Section 5.3, Item 1.a.	5-6	
	Editorial changes to Sections 5.4.1, 5.4.2, 5.5.2, 5.6.1, 5.6.2, and 5.6.3.	5-7, 5-8, 5-9	
	Added Fire Protection Program key description and removed reference to NWL Program in Section 5.6.4.	5-9	

(continued)

HISTORY OF REVISIONS (continued)

Rev. No.	Description of Change	Affected Pages	Date Approved
2	Editorial changes to Sections 5.6.5 through 5.6.8.	5-10	09/12/2018
	Modified Section 5.7.1, Item 1.	5-11	
	Added "less than or equal to" to Section 5.7.3, Item #1.	5-11	
	Modified Section 5.7.4 and added "door" to Item #2.	5-12	
	Modified Sections 5.7.6 and 5.7.7.	5-12	
	Modified Section 5.7.8 to include a FIREWATCH during SCE operations at the (b) (7)(E) Area, in the Drifts, and in the Zero Room and added qualification and training requirements.	5-13	
	Modified Section 5.7.10.	5-13	
	Modified Section 5.7.13, deleted Section 5.7.14, Severe Weather Restriction, and modified Section 5.7.15 text and section title.	5-14	
	Modified Section 5.7.19; deleted Section 5.7.20, Use of Lightning-Induced Electromagnetic Pulse (LIEMP) Covers; added Section 5.7.21, Qualified Explosives Handlers; and added Section 5.7.22, Use of High-Energy Initiators for Subcritical Experiments.	5-15	
	Added new references.	5-16	
	Removed all references to IONEX and removed all references to serial numbers in Section 6.3.3 and Table 6-3.	6-4	
	Modified the ISIs in Tables 6-5 and 6-6.	6-5, 6-6	
	Added new references.	6-7	
	Deleted "or trains" in LCO 3.0.2.	A3/4 0-3	
	Editorial changes in LCO 3.0.3, LCO 3.0.4, SR 4.0.1, SR 4.0.3, and SR 4.0.4.	A3/4 0-4, 0-5, 0-7, 0-8, 0-9, 0-10	
	Removed "slows and/or" in SR 4.1.1.2.	A3/4 1-2	
	Changed reference in SR 4.1.2.1 and SR 4.1.2.2.	A3/4 1-5, 1-6	
	Corrected (b) (7)(E) to (b) (7)(E) and modified Condition A, third paragraph in Bases A3.1.3.	A3/4 1-8, 1-9	

(continued)

HISTORY OF REVISIONS (continued)

Rev. No.	Description of Change	Affected Pages	Date Approved
2	Added "or Staging Stand" to Condition C, second paragraph in Bases 3.1.3. Corrected SR number references. Added Bases 3.1.5, Severe Weather Restriction.	A3/4 1-13 A3/4 1-15 A3/4 1-18, 1-19, 1-20	09/12/2018
2 CN1	Added "and ensure environmental seals are installed" and additional descriptive details of the ventilation system to Section 5.7.4	5-12	12/12/2018
3	U1a DSA 2019 Annual Update	Various	10/30/2019

1	3 CN1	Incorporated Conditions of Approval and issues for next update as identified in NNSA/NFO approval letter dated October 30, 2019, OAMOS:BCC-20005, and Safety Evaluation Report (SER), AMOS-SER-2020-001, Revision 0, October 2019. Added "less than or equal to 500 feet/minute" to SR 4.1.1.2 Modified Section 5.7.8 and added "Vessel Confinement System with top closure plate in place and secured." Added SAC 5.7.23 (b) (7)(E) Speed Modified 6.3.5 Bases: added "prior to and", replaced "impacts and drops" with "hazards", and added Nuclear Air Cleaning Handbook reference. Added "The PLCs and track limit switches prevent the hoist cage from impact due to overtravel" and (b) (7)(E) Control System credited item details to A3.1.1 Bases. Added "at the reduced speed of less than or equal to 500 feet/minute" to SR 4.1.1.2. Changed (b) (7)(E) deceleration force from 1g to 3.9g. Modified (b) (7)(E) Fire Detection System and (b) (7)(E) and (b) (7)(E) safety function, and added reference to the Fire Protection Design Requirement Exemption. Added NSTec 2012 Request for Exemption to References.	3/4 1-2 5-13 5-15 6-6 A3/4 1-1 A3/4 1-2 A3/4 1-4 A3/4 1-8 A3/4 1-15	4/17/2020

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		ALL	2
		ALL	3
	2 Safety Limits	ALL	0
		ALL	1
	3/4 Operating Limits and Surveillance Requirements	ALL	0
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	Appendix A – Bases	ALL	0
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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
ARL/SORD	Air Resources Laboratory, Special Operations and Research Division
CFR	Code of Federal Regulations
CDU	capacitor discharge unit
DAF	Device Assembly Facility
DF	Design Feature
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DTO	Diagnostic Test Object
DSA	Documented Safety Analysis
ft	foot (feet)
FHA	Fire Hazard Analysis
g	gram
HC	Hazard Category
HE	high explosive(s)
HEPA	high-efficiency particulate air (filter)
hr	hour
ISI	In-Service Inspection
JLON	Joint Laboratory Office – Nevada
kg	kilogram
LANL	Los Alamos National Laboratory
lb	pound(s)
LCO	Limiting Condition for Operation
LCS	Limiting Control Setting

(continued)

ACRONYMS AND ABBREVIATIONS (continued)

LED	Local Emergency Director
LLNL	Lawrence Livermore National Laboratory
µm	micrometer
MAR	MATERIAL AT RISK
M&O	Management and Operating
MSHA	Mine Safety and Health Administration
MSTS	Mission Support and Test Services, LLC
M&TE	measurement and test equipment
NCSP	Nuclear Criticality Safety Program
NFPA	National Fire Protection Association
NNSA	U.S. Department of Energy, National Nuclear Security Administration
NNSA/NFO	U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office
NNSS	Nevada National Security Site
NOAA	U.S. National Oceanic and Atmospheric Administration
NPH	natural phenomena hazard
NSTEC	National Security Technologies, LLC
NWL	Nuclear Weapons Laboratory
ORPS	Occurrence Reporting and Processing System
PISA	Potential Inadequacy of the Safety Analysis
PRHA	Process Hazard Analysis
PSIG	pounds per square inch gauge
PUE	plutonium equivalent
REM	roentgen equivalent man
REOP	Real Estate Operations Permit
SAC	SPECIFIC ADMINISTRATIVE CONTROL

(continued)

ACRONYMS AND ABBREVIATIONS (continued)

SARP	Safety Analysis Report for Packaging
SC	Safety Class
SCE	subcritical experiment
SL	safety limit
SMP	Safety Management Program
SNM	Special Nuclear Material
SR	Surveillance Requirement
SS	Safety Significant
SSC	structure, system, and component
T&F	timing and firing
TNT	trinitrotoluene
TSR	Technical Safety Requirement
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination

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Section 1
Use and Application

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1.0 USE AND APPLICATION

1.1 Introduction and Scope

1.1.1 Technical Safety Requirement Applicability

This document establishes Technical Safety Requirements (TSRs) for the Subcritical Experiments (SCEs) conducted at the U1a Complex at the Nevada National Security Site (NNSS). The key organizations responsible for SCE design and execution at the U1a Complex are the Nuclear Weapons Laboratories (NWLs) responsible for the SCE under the Joint Laboratory Office – Nevada (JLON) and the Management and Operating (M&O) Contractor. The JLON organization is a partnership of the Los Alamos National Laboratory (LANL) and the Lawrence Livermore National Laboratory (LLNL).

The functions of the SCE activities are to provide:

- Information on equations of state for plutonium and other selected materials
- Experiments in support of national security interests

These activities may be conducted with high explosive(s) (HE), Special Nuclear Material (SNM), and other radioactive materials, in various combinations.

Operation of the U1a Complex is performed under a primary Real Estate Operations Permit (REOP) between the U.S. Department of Energy, National Nuclear Security Administration Nevada Field Office (NNSA/NFO) and the M&O Contractor. Execution of the SCE is performed under a secondary REOP between the NNSA/NFO, M&O Contractor, and JLON. The primary and secondary REOPs provide the facility authorization and agreements to perform the required tasks to successfully execute the SCE.

These TSRs are derived from safety requirements specified in the U1a Complex Subcritical Experiments Documented Safety Analysis (DSA). These requirements address the minimum performance levels necessary to maintain safety for SCE execution through elimination, containment, and mitigation of hazard consequences, independent of process efficiency or product quality. These TSRs define the Limiting Conditions for Operation (LCOs), ACTIONS, and Surveillance Requirements (SRs), the bases thereof, safety boundaries, and management or administrative controls necessary to ensure the safe operation of the experiments. These requirements protect the health and safety of the public and minimize the potential risk to workers from the uncontrolled release of radioactive and hazardous materials.

(continued)

1.1 Introduction and Scope (continued)

These TSRs apply to operations for the U1a Complex. The DSA establishes the U1a Complex as a Hazard Category (HC)-2 nuclear facility per U.S. Department of Energy (DOE) Standard DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports* (DOE 1997), and NNSA SD G 1027, Admin Change 1, *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1* (DOE 2014).

Assembly of SCEs and SNM Diagnostic Test Objects (DTOs) are performed at the Device Assembly Facility (DAF), with subsequent transfer to the U1a Complex.

1.1.2 Methodology

This TSR document was prepared per the guidance provided in DOE Guide DOE G 423.1-1B, *Implementation Guide for Use in Developing Technical Safety Requirements* (DOE 2015), and in compliance with Title 10 Code of Federal Regulations (CFR) Part 830.205, *Technical Safety Requirements.* TSR controls required for the protection of offsite and onsite individuals were determined per the guidance provided in DOE-STD-3009-94, Change Notice 3, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses* (DOE 2006). The requirements contained in this TSR ensure the safety of the offsite public and the onsite worker from chemical and radiological hazards associated with the SCE.

1.2 Definitions

NOTE: The terms defined in this section appear in capitalized type and are applicable throughout this TSR document. The use of these terms without capitalization implies the common dictionary definition.

Term	Definition
ACTIONS	The steps listed in each TSR that are required to be performed upon discovery that a specified LCO has not been met. ACTIONS consist of the Required Actions to be taken under designated Conditions within specified Completion Times.
AREA	A specified AREA in the facility that may consist of a shaft, drift, room, several rooms, or an entire AREA. An AREA may be a portion of a facility or an entire facility AREA covered by a particular operation or procedure (see Table 1-1 for AREA descriptions).
EXPERIMENT ACTIVE OPERATIONS	One of two MODES defined in Section 1.3 for the SCE.
EXPERIMENT COLD STANDBY	One of two MODES defined in Section 1.3 for the SCE.
FIRE AREA	See (b) (7)(E) FIRE AREA.
FIREWATCH	Observation by a dedicated individual trained to respond appropriately to conditions adverse to fire safety.
IMMEDIATELY	Term used as Completion Time for Required Action statements when a step is to be initiated as soon as possibly achievable without creating a less stable condition, and continuously and aggressively pursued until complete.

(continued)

1.2 Definitions (continued)

Term	Definition
INOPERABLE/INOPERABILITY	A system, subsystem, component, or device shall be INOPERABLE or have INOPERABILITY when it is not capable of performing its specified nuclear safety function(s), or when any necessary support system (e.g., attendant instrumentation, control, electrical power, cooling or seal water, lubrication, or other auxiliary equipment), which is required for the system, subsystem, component, or device to perform its function(s), is not capable of performing its related support function(s).
MATERIAL AT RISK (MAR)	The amount of radioactive material available to be acted on by a given physical stress. For an affected AREA, or activity, the MAR is a value representing a maximum quantity of radioactive material present or reasonably anticipated for the process or structure being analyzed. This value does not include sealed sources that meet the criteria of DOE-STD-1027-92 (DOE 1997), Attachment 1, *Hazard Categorization*. MAR does not include U1a Complex entombed material from previous experiments.
MODE	An administratively defined condition applied to an AREA that limits the allowed activity in that AREA and requires specific controls be in place to manage the hazards created by any allowed activities. See Section 1.3 for descriptions of the MODES for the SCE.
OPERABLE/OPERABILITY	A system, subsystem, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its nuclear safety function(s), and when all necessary support systems are also capable of performing their related support function(s).

(continued)

1.2 Definitions (continued)

Term	Definition
SECURED SHIPPING CONTAINER	A Type B Shipping Container containing a Diagnostic Test Object (DTO) or an SCE Container containing an SCE that has not been opened (or in the case of the DTO, has been properly repackaged for transportation) and is therefore in its original condition as received upon delivery to the U1a Complex.
SPECIFIC ADMINISTRATIVE CONTROLS (SACs)	An administrative control 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 structure, system, and component (SSC) (e.g., discrete operator actions, combustible loading program limits, radioactive and hazardous material limits protecting hazard analyses, or facility categorization).
SUBCRITICAL EXPERIMENT (SCE)	Special Nuclear Material (SNM) mated with high explosives (HE).
TIME OF DECLARATION	The actual time when the Facility Manager or designee determines that a problem exists that requires entry into a Condition in the ACTION section of an LCO. As soon as possible upon notification of a problem, the problem should be evaluated and a declaration made by the Facility Manager or designee if it is determined that an LCO statement is not met.
TRANSIENT COMBUSTIBLES	TRANSIENT COMBUSTIBLES are defined as combustible/flammable items that are not part of the permanent facility structure, installed facility components, accessories, or equipment. TRANSIENT COMBUSTIBLES may include, but may not be limited to, the following: combustible parts of tools and equipment (e.g., cable insulation), general trash, paper or plastic products, packing/packaging materials.

(continued)

1.2 Definitions (continued)

Term	Definition
(b) (7)(E) FIRE AREA	The AREA of the U1a COMPLEX UNDERGROUND that occupies the entire (b) (7)(E) and (b) (7)(E); the (b) (7)(E), east of the (b) (7)(E) Fire Barrier and the (b) (7)(E), west of the (b) (7)(E) Fire Barrier. This fire area is monitored and protected by the (b) (7)(E) Fire Detection System.
U1a COMPLEX UNDERGROUND	Includes all vertical shafts and tunnels/drifts below the ground surface within the U1a Complex.
UNPACKING LOCATION	The U1a COMPLEX UNDERGROUND location where the SCE is unpacked from the SCE Container in which it was transported.
VERIFY/VERIFICATION	To confirm and substantiate that an activity has been implemented in conformance with the specified requirements. Manipulation of equipment or instrumentation to conform to the specified requirements is not permitted. Formal methods other than direct observation may be used. VERIFICATION of actual equipment parameters may be conducted by direct observation or by using measurement equipment as applicable (e.g., a review of records to VERIFY surveillances are current or passive measurement).
VIOLATION (TSR)	See Section 5.3.3.

1.2 Definitions (continued)

Table 1-1. AREA Descriptions

AREA Name	AREA Description
(b) (7)(E)	The AREA that occupies the vertical shaft from the (b) (7)(E) AREA to the (b) (7)(E)
(b) (7)(E) AREA	The AREA within the fence at the (b) (7)(E) AREA, excluding the (b) (7)(E)
(b) (7)(E) FIRE AREA	The AREA that occupies the entire (b) (7)(E) the (b) (7)(E) east of the (b) (7)(E) Fire Barrier and the (b) (7)(E) (b) (7)(E) west of the (b) (7)(E) Fire Barrier.
(b) (7)(E) Zero Room	The AREA that occupies the (b) (7)(E) from Plug #1 and Plug #2 and the (b) (7)(E) with equipment and personnel access doors and Post-Execution Ventilation System closure valves, penetrations (power, diagnostics, chilled water, grout line, vent lines, and environmental seals).
Experiment Insertion Path	The AREA from the (b) (7)(E) AREA, down the (b) (7)(E) to the (b) (7)(E) to the (b) (7)(E) to the (b) (7)(E) Zero Room.

1.3 Modes

NOTE: The MODES defined in this section are capitalized and are applicable throughout this TSR document.

PURPOSE	The purpose of this section is to explain the use and application of MODES in the U1a Complex associated with the SCE.
USE OF MODES	Applicable MODES must be specified for each LCO. The MODES of operation for an affected AREA are the operational states of the affected AREA with respect to the ability to perform the intended mission.
AREA	Each affected AREA is administratively placed in a particular MODE based on the activities allowed in the individual affected AREA.

Table 1-2. MODE Descriptions

MODE	DESCRIPTION
EXPERIMENT ACTIVE OPERATIONS	SCE operations involving SNM (SCE or DTO) are allowed. Normal U1a Complex operations are allowed per the U1a Complex Hazard Analysis unless restricted by the TSRs.
EXPERIMENT COLD STANDBY	No SNM is present or allowed in the U1a Complex. Normal U1a Complex operations are allowed per the U1a Complex Hazard Analysis.

1.4 Frequency Notation

PURPOSE

The purpose of this section is to explain the application and use of frequency notation for SRs.

BACKGROUND

Each SR has a specified frequency in which the surveillance shall be performed. The frequency notation used is in accordance with DOE G 423.1-1B (DOE 2015).

FREQUENCY NOTATION

The frequency notations used in this TSR document are defined in Table 1-3.

USE OF FREQUENCY/ PERIODICITY

To prevent a possible violation, the SR must be completed within the stated frequency. For SRs, the frequency requirement may be extended to 1.25 times the specified interval based on general SR 4.0.3. This extension applies only to the frequency specification for SRs and does not apply to a periodicity requirement for Required Action statements, to intervals for In-Service Inspections (ISIs), nor to non-periodic or conditional SRs. The time extension provides operational flexibility for completion of SRs. It shall not be relied upon as a routine extension of the specified interval. Routine reliance on the extension of the specified interval for SRs is a violation.

Performance of LCO SRs shall be documented. If a time extension is necessary prior to completion of an SR, the need for the extension of the specified interval must be formally documented before the regular frequency interval specified in the second column of Table 1-3 has passed. If compliance with the TSRs is not formally documented, then compliance with the TSRs cannot be demonstrated and a violation may exist.

Table 1-3. Frequency Notation

NOTATION	FREQUENCY	1.25 × FREQUENCY
Quarterly	At least once every 92 days	115 days
Semi-Annually	At least once every 184 days	230 days
Annually	At least once every 365 days	456 days

Note: The 1.25 multiplier does not apply to Completion Times for Required Action statements or to intervals for ISIs.

1.5 Logical Connectors

PURPOSE

The purpose of this section is to explain the use and application of logical connectors.

BACKGROUND

Logical connectors are used in TSRs to discriminate between (and yet connect) discrete conditions, Required Actions, Completion Times, SRs, and frequencies. The logical connectors include "**AND**" and "**OR**." The physical arrangement of this connector on a page constitutes a specific meaning per the convention established in DOE G 423.1-1B (DOE 2015).

USE OF LOGICAL CONNECTORS

Several levels of logic may be used to state the Required Action. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (for example, left-justified with the number of the Required Actions). The successive levels of logic are identified by additional digits of the Required Actions number and by successive indenting of the logical connectors.

DEFINITION OF LOGIC TERMS

The defined terms of this section appear in capitalized type, bolded, and underlined throughout the TSR document.

	Definition
AND	Used to connect two or more sets of criteria that must both (all) be satisfied for a given logical decision.
OR	Used to denote alternate combinations or conditions, meaning either one or the other criterion will satisfy a given logical decision.

APPLICATION

See Table 1-4 for an example of the application of logical connectors used in this TSR document.

(continued)

1.5 Logical Connectors (continued)

Table 1-4. Use and Application of Logical Connectors

CONDITION	REQUIRED ACTION		COMPLETION TIME
Situation that does not meet statement	A.1	Terminate A	IMMEDIATELY
	AND		
	A.2	Perform B	1 hour (hr)
	AND		
	A.3.1	Restore V	1 hr
		OR	
	A.3.2.1	Initiate C	2 hr
		AND	
	A.3.2.2	Place the Facility in MODE S	4 hr

The logic shown in the tabular presentation above allows only two approved outcomes upon occurrence of the specified situation that does not meet the LCO:

(1) A.1 (Terminate A), and A.2 (Perform B), and A.3.1 (Restore V); or

(2) A.1 (Terminate A), and A.2 (Perform B), and A.3.2.1 (Initiate C), and A.3.2.2 (Place the facility in MODE S).

1.6 Completion Times

PURPOSE	The purpose of this section is to explain the use and application of Completion Time.
BACKGROUND	LCOs specify the limits that represent the lowest functional capabilities or performance levels that are required for safe operations. The LCO identifies Conditions for which these functional or performance requirements are not met, and the LCO states Required Actions that may be taken within a limited time (the Completion Time). The Required Action statements provide interim remedial actions or compensatory protection for the same safety concerns as the LCO while attempting to restore the functional capabilities or performance levels required by the LCO. Failure to complete the Required Action within the associated Completion Time results in a violation of the LCO (see Section 5.3.3). Completion Times are specified in this TSR document using the "three-column format."
USE OF COMPLETION TIME	The Completion Time is the amount of time allowed to complete a Required Action and is referenced to the TIME OF DECLARATION. Once a Condition has been entered, subsequent discovery of subsystems, components, or variables that are INOPERABLE or not within limits as a result of cascading effects from entering the Condition shall not result in a separate entry into the Condition. The Required Actions of the Condition continue to apply to each additional failure, and Completion Times are based on initial entry into the Condition. Entry into an LCO Condition and LCO Required Action Completion Times shall be documented. If compliance with TSR requirements is not formally documented, then compliance with the TSRs cannot be demonstrated and a violation may exist.

References

10 CFR 830. *Technical Safety Requirements*. Title 10 CFR Part 830, Section 830.205, U.S. Government Publishing Office, U.S. Department of Energy, Washington, D.C.

DOE 1997. *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*. DOE-STD-1027-92, U.S. Department of Energy, Washington, D.C., September 1997.

DOE 2006. *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analyses*. DOE-STD-3009-94, Change Notice 3, U.S. Department of Energy, Washington, D.C., March 2006.

DOE 2014. *Guidance on Using Release Fraction and Modern Dosimetric Information Consistently with DOE STD 1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports, Change Notice No. 1*. NNSA SD G-1027, CN 1, U.S. Department of Energy, Washington, D.C., May 2014.

DOE 2015. *Implementation Guide for Use in Developing Technical Safety Requirements*. DOE G 423.1-1B, U.S. Department of Energy, Washington, D.C., March 2015.

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Section 2
Safety Limits

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2.0 SAFETY LIMITS

2.1 Safety Limits

As defined in 10 CFR 830, *Nuclear Safety Management*, Safety Limits (SLs) are limits on process variables associated with those Safety-Class (SC) physical barriers, generally passive, that are necessary for the intended facility function and that are required to guard against the uncontrolled release of radioactive materials. The Safety Analysis did not determine any single limit that, if exceeded, could directly cause the failure of a barrier that prevents the release of radioactive or hazardous material. Therefore, no SLs are required.

2.2 Limiting Control Settings

As defined in 10 CFR 830, Limiting Control Settings (LCSs) are associated with SLs, and shall be conservatively selected such that automatic or manual protective action will correct the abnormal situation before an SL is exceeded. No SLs have been identified for the SCE; therefore, no LCSs are required.

References

10 CFR 830. *Nuclear Safety Management*. Title 10 CFR Part 830, U.S. Government Publishing Office, Washington, D.C.

Section 3/4
Operating Limits
and
Surveillance Requirements

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3/4.0 APPLICABILITY

3.0 Limiting Control Settings and Limiting Conditions for Operation

LCO 3.0.1 LCOs Shall Be Met

LCO statements shall be met during the MODES or other specified conditions in the LCO Applicability, except as provided in LCO 3.0.2.

LCO 3.0.2 ACTIONS Shall Be Met

Upon discovery of a failure to meet an LCO statement, the associated ACTIONS shall be met, except as provided in LCO 3.0.5. If compliance with the associated LCO statement is restored before the specified Completion Time expires for a Required Action, completion of the Required Action is not required, unless otherwise stated.

LCO 3.0.3 ACTIONS Not Met or Not Provided

When an LCO statement is not met, and the associated ACTIONS are not met or when associated ACTIONS are not provided, the affected AREA shall be placed in a MODE or other specified condition in which the LCO is not applicable. Activities shall be initiated within 1 hr to place the affected AREA in EXPERIMENT COLD STANDBY and efforts continued until the mode change is achieved, or the LCO is no longer applicable.

Where corrective measures are completed that permit operation per the LCO or its ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.4 MODE Change

When an LCO is not met, a MODE or other specified condition in the statement of applicability shall not be entered, except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the statement of applicability for an unlimited period of time. LCO 3.0.4 shall not prevent changes in MODE or other specified conditions in the statement of applicability that are required to comply with ACTIONS.

(continued)

3.0 Limiting Control Settings and Limiting Conditions for Operation (continued)

LCO 3.0.5 Return to Service

Equipment removed from service or declared INOPERABLE to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This exception to LCO 3.0.2 allows for the system to be returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

3/4.0 APPLICABILITY

4.0 Surveillance Requirements

SR 4.0.1 SURVEILLANCE REQUIREMENTS Shall Be Met

SRs shall be met during the MODES or other specified conditions for individual LCOs unless otherwise stated in an individual SR.

SR 4.0.2 Frequency Shall Be Met

Each SR shall be performed within the specified frequency or non-periodic condition.

SR 4.0.3 Frequency Extension and Exceptions

Failure to perform an SR within 1.25 times the specified time interval (violation) shall constitute a failure to meet the OPERABILITY requirements for an LCO, except as provided below. If the SR is not performed within the specified frequency period (including the time extension), the LCO shall be immediately declared to be "not met," and the applicable ACTIONS shall be entered. This constitutes the TIME OF DECLARATION. The Completion Times of the Required Actions begin immediately upon expiration of the specified frequency period (including the time extension) or at the TIME OF DECLARATION, if different. When the SR is performed within the specified frequency period (including the time extension), and the OPERABILITY requirements are not met, the LCO shall immediately be declared to be "not met," and the applicable ACTIONS shall be entered. The Completion Times for the Required Actions begin immediately upon failure to meet the OPERABILITY requirements.

If it is discovered that an SR was not performed within its specified frequency, the TIME OF DECLARATION, at which time the LCO is declared "not met," may be delayed from the time the original frequency period has ended up to 24 hr, or up to the end of the frequency that includes the time extension (as specified in Table 1-3), whichever is less. This extension period is permitted to allow for the performance of the surveillance before the specified ACTION is entered. This accommodation does not preclude notification of a violation. If the surveillance is performed within the extension period, entry into ACTIONS is not required.

Surveillances do not have to be performed on equipment that is INOPERABLE or on support systems for equipment that is INOPERABLE (unless they are required to support other equipment).

(continued)

4.0 Surveillance Requirements (continued)

SR 4.0.4 MODE Changes

Entry into any MODE specified in the individual LCO shall not be made unless the SRs associated with the LCO have been met within their stated SR interval. This provision shall not prevent passage through or to a MODE as necessary to comply with Required Actions.

3/4.1 LIMITING CONDITIONS FOR OPERATION

3.1.1 (b) (7)(E) Control System

LCO 3.1.1: The (b) (7)(E) Control System shall be OPERABLE.

MODE APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS ((b) (7)(E) (b) (7)(E)).

AREA APPLICABILITY: (b) (7)(E)

(continued)

3.1.1 (b) (7)(E) Control System (continued)

ACTIONS

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
A. (b) (7)(E) Control System is INOPERABLE.	A.1 Cease all (b) (7)(E) operations involving an SCE. **AND** A.2 Restore the (b) (7)(E) Control System to OPERABLE status.	IMMEDIATELY Prior to performance of hoist operations involving an SCE

SURVEILLANCE REQUIREMENTS

SR	SURVEILLANCE	FREQUENCY
4.1.1.1	Perform a Visual Inspection of the (b) (7)(E) Equipment This SR shall involve the following specific activities: (1) Verify that the hoist is free of leaks, spills, obvious wear and loose bolts; and that the anchorage is secure. (2) Verify that the brake mechanical system is free of damage, defects, or degradation.	Within 24 hr prior to use to transport an SCE
4.1.1.2	Perform an Operability Test of the (b) (7)(E) This SR shall involve the following specific activities: (1) Verify that the hoist stops when brakes are applied. (2) Verify that the hoist has gone through (b) (7)(E) (b) (7)(E)	(b) (7)(E)
4.1.1.3	Perform a Safety Function Test of the (b) (7)(E) This SR shall involve testing of components required to support the (b) (7)(E) safety function.	Annually
4.1.1.4	Perform a Load Test of the (b) (7)(E) This SR shall involve load testing of components required to support the (b) (7)(E) safety function.	Annually

1

3.1.2 (b) (7)(E) Conveyance Safety Catch System

LCO 3.1.2: The (b) (7)(E) Conveyance Safety Catch System shall be OPERABLE.

MODE APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS (when SNM is being transported up or down the (b) (7)(E).

AREA APPLICABILITY: (b) (7)(E)

ACTIONS

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
A. (b) (7)(E) Conveyance Safety Catch System is INOPERABLE.	A.1 Cease all (b) (7)(E) operations involving SNM. **AND** A.2 Restore the (b) (7)(E) Conveyance Safety Catch System to OPERABLE status.	IMMEDIATELY Prior to performance of hoist operations involving SNM

SURVEILLANCE REQUIREMENTS

SR	SURVEILLANCE	FREQUENCY
4.1.2.1	Perform a visual inspection of the cage safety catches to ensure they can perform their function.	Within 24 hr prior to use
4.1.2.2	Perform a visual inspection of the cage safety catches and the (b) (7)(E) wooden guides.	Within 7 days prior to use
4.1.2.3	Perform a slack rope test of the safety catches and their activating mechanisms.	Within 7 days prior to use

3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers

LCO 3.1.3: The (b) (7)(E) Fire Detection System and (b) (7)(E) Fire Barriers shall be OPERABLE.

MODE APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS.

AREA APPLICABILITY: Within the fence at the (b) (7)(E) AREA and U1a COMPLEX UNDERGROUND.

ACTIONS

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
A. The (b) (7)(E) Fire Detection System and/or the (b) (7)(E) or (b) (7)(E) Fire Barriers are INOPERABLE. **AND** The SNM is outside the (b) (7)(E) FIRE AREA and within its SECURED SHIPPING CONTAINER.	A.1.1 Move the SNM to the surface outside of the (b) (7)(E) (b) (7)(E) AREA fence and remove TRANSIENT COMBUSTIBLES in the area. **OR** ----------NOTE---------- Required Action A.1.2 is an exception to LCO 3.0.1. ---------- A.1.2 If the SNM is the DTO, move it to the Zero Room. **OR**	1 Day 1 Day

(continued)

3.1.3 (b) (7)(E) Fire Detection System (b) (7)(E) Fire Barriers (continued)

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
A. (continued)	----------NOTE---------- Required Action A.1.3 is an exception to LCO 3.0.1. ----------	
	A.1.3 If the SNM is in the SCE Container, place it in the Zero Room UNPACKING LOCATION and remove TRANSIENT COMBUSTIBLES in the area.	1 Day
	AND	
	A.2 Restore the INOPERABLE System(s) to OPERABLE status.	Prior to SNM unpacking or handling operations within the (b) (7)(E) AREA except that required for Required Actions A.1.1 through A.1.3.

(continued)

3.1.3 (b) (7)(E) Fire Detection System (b) (7)(E) Fire Barriers (continued)

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
B. The (b) (7)(E) Fire Detection System and/or the (b) (7)(E) or (b) (7)(E) Fire Barriers are INOPERABLE. **AND** The SNM is within the (b) (7)(E) FIRE AREA and within its SECURED SHIPPING CONTAINER.	B.1.1 Move the SNM to the surface outside of the (b) (7)(E) AREA fence and remove TRANSIENT COMBUSTIBLES in the area. **OR** B.1.2 If the SNM is the DTO, move it to the Zero Room. **OR** B.1.3 If the SNM is in the SCE Container, place it in the Zero Room UNPACKING LOCATION and remove TRANSIENT COMBUSTIBLES in the area. **AND** B.2 Restore the INOPERABLE System(s) to OPERABLE status.	1 Day 1 Day 1 Day Prior to SNM unpacking or handling operations within the (b) (7)(E) FIRE AREA except that required for Required Actions B.1.1 through B.1.3.

(continued)

3.1.3 (b) (7)(E) Fire Detection System (b) (7)(E) Fire Barriers (continued)

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
C. The (b) (7)(E) Fire Detection System and/or the (b) (7)(E) or (b) (7)(E) Fire Barriers are INOPERABLE. **AND** The SNM is within the (b) (7)(E) FIRE AREA but **not** within its SECURED SHIPPING CONTAINER.	C.1.1 Move the SNM to an approved location in the Zero Room per Table 3-1. **OR**	1 Day

(continued)

3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
C. (continued)	C.1.2 If the SNM is in the SCE Container with the lid in place but not secured, leave the SNM as is and remove TRANSIENT COMBUSTIBLES in the area. **OR**	1 Day
	C.1.3 If the only SCE Container unpacking operation that has occurred is lid removal, replace the SCE Container lid and leave it as is and remove TRANSIENT COMBUSTIBLES in the area. **AND**	1 Day
	C.2 Restore the INOPERABLE System(s) to OPERABLE status.	Prior to SNM unpacking or handling operations within the (b) (7)(E) FIRE AREA except that required for Required Actions C.1.1 through C.1.3.

SURVEILLANCE REQUIREMENTS

SR	SURVEILLANCE	FREQUENCY
4.1.3.1	Perform a functional test of the (b) (7)(E) Fire Detection System.	Semi-Annually
4.1.3.2	Perform a functional test of the (b) (7)(E) Fire Barrier fire doors, supply and exhaust ventilation fire/smoke dampers, and barrier wall dampers.	Annually

(continued)

Table 3-1. SNM Approved Locations

General Area	Approved Location
Zero Room	1. On the Arming Table or Staging Stand. 2. Inside the Vessel Confinement System with top closure plate in place and secured. 3. Secured on the Insertion Cart near the Arming Table or Staging Stand.

3.1.4 SECURED ZERO ROOM CONFIGURATION

LCO 3.1.4: Secured Zero Room Configuration SHALL be maintained at the end of the operational day.

MODE APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

AREA APPLICABILITY: Zero Room

ACTIONS

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
A. Zero Room NOT Secured	A.1 Cease all operations involving SNM in the Zero Room. **AND** A.2 Sweep Zero Room to remove TRANSIENT COMBUSTIBLES not needed to support the experiment and lock the Zero Room.	IMMEDIATELY Prior to Securing the Zero Room

SURVEILLANCE REQUIREMENTS

SR	SURVEILLANCE	FREQUENCY
4.1.4.1	Sweep the Zero Room to ensure that TRANSIENT COMBUSTIBLES not needed to support the experiment are removed from the Zero Room at the end of the operational day and lock the Zero Room when an SCE or SNM DTO is present in the Zero Room.	Prior to Securing the Zero Room

3.1.5 SEVERE WEATHER RESTRICTION

LCO 3.1.5: SCE Handling Operations at the (b) (7)(E) AREA shall not be performed when a high wind condition or the occurrence of lightning strikes is in effect at the U1a Complex.

MODE APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

AREA APPLICABILITY: Within the fence at the (b) (7)(E) AREA

ACTIONS

CONDITION	REQUIRED ACTIONS	COMPLETION TIME
A. A High Wind Warning has been identified at the U1a Complex.	A.1 Place or leave the shipping container with SCE in the secured transport vehicle.	IMMEDIATELY
	OR	
	A.2 Transfer the shipping container with SCE down the (b) (7)(E) to a location in the Zero Room as directed.	IMMEDIATELY
B. Lightning strike occurrences have been detected at the U1a Complex within a 20-mile radius.	B.1 Place or leave the shipping container with SCE in the secured transport vehicle.	IMMEDIATELY
	OR	
	B.2 Transfer the shipping container with SCE down the (b) (7)(E) to a location in the Zero Room as directed.	IMMEDIATELY

(continued)

3.1.5 Severe Weather Restriction (continued)

SURVEILLANCE REQUIREMENTS

SR	SURVEILLANCE	FREQUENCY
4.1.5.1	Verify that a High Wind Warning is not in effect at the U1a Complex.	30 minutes prior to performing SCE Handling Operations in the (b) (7)(E) AREA and during SCE Handling Operations until the SCE Container containing an SCE is in a location in the Zero Room as directed.
4.1.5.2	Verify that no lightning strike occurrences have been detected at the U1a Complex within a 20-mile radius.	30 minutes prior to performing SCE Handling Operations in the (b) (7)(E) AREA and during SCE Handling Operations until the SCE Container containing an SCE is in a location in the Zero Room as directed.

Section 5
Administrative Controls

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5.0 ADMINISTRATIVE CONTROLS

5.1 Purpose

The purpose of administrative controls is to state the provisions relating to organization and management, procedures, record keeping, review and audit, reporting, and Safety Management Programs (SMPs) necessary to ensure safe operations involving SCEs.

Unless otherwise noted, these administrative controls are applicable to the SCE during all MODES as specified in Section 1.2 of this TSR document.

5.2 Organization and Management Responsibilities

Lines of authority, responsibility, and communication shall be established and defined including all safety and operating organization positions to ensure the safety of operations, as defined by the DSA. These relationships shall be documented and updated, as appropriate, in the form of organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation.

The key organizations responsible for SCE design, fielding, and execution at the U1a Complex are the NWL and M&O Contractor. Design and development of SCEs are performed at the NWL. JLON works closely with the M&O Contractor to ensure that the interface between the U1a Complex infrastructure and the SCE is appropriately coordinated. Both the NWL and the M&O Contractor implement their respective and relevant SMPs for safe SCE project fielding and execution.

5.2.1 Deleted.

5.2.2 Deleted.

(continued)

5.2 Organization and Management Responsibilities (continued)

5.2.3 Minimum Staffing Requirements

EXPERIMENT ACTIVE OPERATIONS
The minimum staffing requirements are presented in Table 5-1.

Table 5-1. Minimum Staffing for EXPERIMENT ACTIVE OPERATIONS

Position / Activity	SCE Test Director	Facility Manager*	Local Emergency Director (LED)*
SNM Activities	R	R	R
Timing & Firing (T&F)	R	R	R
SNM Staging	–	–	R

R – required to be in U1a Complex. During normal operational hours, the SCE Test Director, Facility Manager, and LED are required at the facility when SNM is present. The Operations Command Center (OCC) Duty Manager will assume the LED responsibilities during off hours (weekends or overnight), however, the presence of the OCC Duty Manager at the facility is not required.
*Facility Manager and LED may be the same person.

Definitions

SNM Activities	Activities within U1a Complex (e.g. movements, handling, and unpacking of SNM).
T&F	Connection, troubleshooting, testing of T&F circuitry and equipment, and SCE execution while connected to or connecting to an SCE.
SNM Staging	Zero Room is in a secured configuration and SNM is not involved in U1a Complex underground activities.

EXPERIMENT COLD STANDBY
No minimum staffing requirements.

5.3 Technical Safety Requirements

5.3.1 General

The TSRs shall:

1. Be prepared, independently reviewed, and approved per 10 CFR 830 Subpart B, *Safety Basis Requirements*, using DOE G 423.1-1B (DOE 2015) for guidance.
2. Define the controls to ensure that the U1a Complex SCE remains within the safe operating envelope defined in the DSA. The TSRs formally document the requirements in the following sections:

    - Use and application provisions
    - Operating Limits, which include LCOs and SRs
    - Administrative controls
    - Design Features (DFs)
    - Bases statements

3. Be complied with, except for reasonable action taken in an emergency when this action is immediately needed to protect the public health and safety and when action consistent with the TSRs is not immediately apparent.
4. Be maintained as a controlled document.
5. Be updated, as required, to keep them current.
6. Be procedurally controlled, including changes that are:

    - Prepared with a submittal package, including a description of the revision, justification for the change, and supporting analysis (i.e., if applicable, revised DSA pages and supplemental analyses — engineering and/or accident).
    - Reviewed by the appropriate U1a Complex SCE safety basis and safety analyst staff.
    - Approved by the U.S. Department of Energy, National Nuclear Security Administration (NNSA) prior to incorporation of the TSR change.
    - Incorporated into the TSR document.

5.3.2 Compliance

The Facility Manager or designee is responsible for ensuring that the requirements of the U1a Complex TSRs are met. Compliance shall be demonstrated by the following:

1. Operating within the LCOs and associated SRs during their applicability.
2. Operating within the ACTIONS of LCOs when required.
3. Performing all SRs when required.
4. Establishing, implementing, and maintaining the required administrative controls.

(continued)

5.3 Technical Safety Requirements (continued)

5.3.3 Violation of TSR

Violations of a TSR occur as the result of any of the following circumstances:

1. Exceeding an SL or
2. Failure to complete an action statement within the required time limit following exceeding an LCS or failure to comply with an LCO.
3. Failing to perform an SR within the required time limit.
4. Failing to comply with an administrative control statement.
5. DOE G 423.1-1B (DOE 2015) recognizes two different types of administrative control violations:
   a. The first type of administrative control violation is the failure to comply with an SAC written in the form of a directive action administrative control. A single failure to comply with this type of SAC constitutes a TSR violation. (Violations of SACs written in the form of an LCO with SRs are defined in Items 1 and 2, above.)
   b. The second type of administrative control violation is when the intent of a program included in the administrative controls is not fulfilled. A single non-compliance would not necessarily constitute a TSR violation. To qualify as a TSR violation, the failure to meet the intent of the referenced program would need to be significant enough to render the DSA invalid.

5.3.4 Response to TSR Violation

LCO VIOLATION

1. If an LCO is violated, as defined by Item 1 of Section 5.3.3, proceed as follows:
   a. Place the affected AREA in a safe and/or stable configuration by entering LCO 3.0.3;
   b. Notify NNSA of the violation per DOE O 231.1B (DOE 2012a); and
   c. Prepare an occurrence report.

(continued)

5.3 Technical Safety Requirements (continued)

SURVEILLANCE REQUIREMENT VIOLATION

1. If an SR has not been performed within the required frequency (including the time extension), proceed as follows:

    a. Enter SR 4.0.3, and perform the SR within 24 hr or the frequency of the SR, whichever is less:

        - If the SR is successfully met, exit SR 4.0.3 and continue U1a Complex SCE operations in a compliant MODE (Note: Steps b and c below must be met); and
        - If the SR is not successfully met, enter the ACTIONS of the applicable LCO (Note: Steps b and c below must be met);

    b. Notify NNSA of the violation per DOE O 231.1B (DOE 2012a); and
    c. Prepare an occurrence report.

ADMINISTRATIVE CONTROL VIOLATION

1. If an administrative control is violated, proceed as follows:

    a. Notify NNSA of the violation per DOE O 231.1B (DOE 2012a);
    b. Prepare an occurrence report; and
    c. Perform and document a technical evaluation, if appropriate, of the administrative control violation to determine if any damage occurred.

5.3.5 TSR Change Control

Revisions to the bases sections may be made without NNSA approval if the changes are editorial in nature and do not make significant changes. All other changes to the TSR document require the approval of NNSA prior to implementation. As required by 10 CFR 830 Subpart B, the TSR document is examined and approved by NNSA as part of reviewing updates to the safety basis.

5.4 Procedures

5.4.1 General

A procedures program shall be established, implemented, and maintained to control the development, review, approval, and implementation of procedures to address the activities performed to support mission needs. The project implements these procedures to provide sufficient direction to ensure that the U1a Complex SCE is operated within its safety basis and to support safe operation of the U1a Complex SCE.

5.4.2 Review, Approval, Revision, Control, and Temporary Changes

Procedures shall be reviewed and approved in conformance with the following:

1. Procedures shall be approved by appropriate management levels per approved procedures that have been authorized by the Facility Manager and/or the SCE Test Director or designee.
2. New procedures and procedure changes are subject to the Unreviewed Safety Question (USQ) process.

5.5 Reviews and Audits

5.5.1 General

The project is required to conduct periodic audits of the SCE Quality Assurance Program and report any findings to the SCE Test Director. JLON is required to conduct periodic independent and/or management assessments. The assessments are required to be conducted by qualified personnel who are independent of the SCE organization.

5.5.2 Readiness Reviews

A Readiness Review is required for any new or major modification affecting the SCE prior to startup or restart. The scope of the review covers (1) facility and equipment (hardware) readiness, (2) management and personnel readiness, and (3) management programs (procedures, implementation plans, etc.).

5.6 Programs (Safety Management)

A number of SMPs were included in the hazard analysis. While not specifically credited with providing a safety function, these SMPs do contribute to defense-in-depth. Programmatic commitments for these SMPs are summarized in the following subsections.

5.6.1 Conduct of Operations Program

A Conduct of Operations Program shall be implemented and maintained per contractual requirements via M&O Contractor plans and procedures. Conduct of Operations, as defined in DOE O 422.1, Change 2, *Conduct of Operations* (DOE 2014), is the range of requirements to implement the integration of safety into day-to-day nuclear facility activity. For example, it includes second person verification of certain required critical checklist procedural steps, consideration of human factors, experiment readiness, and is applicable to all SCE operations.

5.6.2 Configuration Management Program

A Configuration Management Program shall be implemented and maintained per contractual requirements via plans and procedures. This program shall also monitor and control all credited DFs. This may be accomplished by documentation verification, visual or physical inspections, testing, or any combination as deemed appropriate for the nature of the DF.

5.6.3 Explosives Safety Program

An Explosives Safety Program shall be implemented and maintained per contractual requirements via M&O Contractor and NWL plans and procedures. The program shall address explosives safety planning, notification processes, protective actions, training and exercises, and recovery actions.

The Explosives Safety Program is included in the TSRs to maximize worker safety and minimize the risk to life. Implementing the Explosives Safety Program reduces the frequency of fires as a result of inadvertent initiations and detonations.

5.6.4 Fire Protection Program

A Fire Protection Program shall be implemented and maintained per contractual requirements via the M&O Contractor plans and procedures. The Fire Protection Program for the SCE is a comprehensive program to protect human health and the environment from fire emergencies. The Fire Protection Program includes fire prevention measures, emergency fire response procedures, personnel training, fire notification and alarm systems, emergency drills, and associated equipment.

(continued)

5.6 Programs (Safety Management) (continued)

5.6.5 Nuclear Criticality Safety Process

A Nuclear Criticality Safety Process shall be implemented to address criticality safety risks at the NNSS. This process involves the implementation of the requirements of the M&O Contractor's Nuclear Criticality Safety Program (NCSP) and the NWL's respective NCSPs through the integration process. Operational Criticality Safety Limits for the U1a Complex and each SCE are determined in nuclear criticality safety evaluations and Experiment Execution Plans as necessary. All derived controls are evaluated through the PD-NOPS.003, *Integrated Nuclear Criticality Safety Program Description* (MSTS 2018a), to determine if any derived controls warrant elevation to the TSRs. Any identified limits (controls) determined by the evaluation to warrant elevation are provided in Chapter 4 of this DSA, carried into Chapter 5, and included in the TSRs; all derived controls will be implemented during operations.

5.6.6 Radiological Safety Management Program

A Radiological Safety Management Program shall be implemented and maintained per contractual requirements via the *Nevada National Security Site Radiological Control Manual* (MSTS 2018b), M&O Contractor programs, and NWL programs defined in plans and procedures. The program provides requirements for a radiological control plan addressing protective actions, monitoring, training, reentry, and recovery (if necessary) and ensures that radiation exposures are maintained as low as reasonably achievable (ALARA).

5.6.7 Emergency Preparedness Program

An Emergency Preparedness Program shall be implemented and maintained per contractual requirements via M&O Contractor plans and procedures. The program shall address emergency preparedness planning, including the activation of emergency organizations, assessment actions, notification processes, emergency facilities and equipment, protective actions, training and exercises, and recovery actions.

5.6.8 Maintenance Management Program

A Maintenance Management Program shall be implemented and maintained per contractual requirements via M&O Contractor plans and procedures. The Maintenance Management Program at the U1a facilities consists of several activities and elements that are conducted to ensure that the facilities and SSCs are maintained in a condition suitable for performing their designated purpose. This program includes planned or unplanned periodic, preventive, predictive, seasonal, or corrective (repair) maintenance.

5.7 Specific Administrative Controls

This section compiles the directive action SACs. SACs that are included as LCOs with SRs are presented in Section 3/4.

5.7.1 Radiological Material Inventory Control

The total MAR for all non-entombed experiments at risk in the U1a Complex shall be limited to a maximum quantity of (b) (7)(E) .

5.7.2 Entombment of Previous Subcritical Experiments

A new SCE or SNM DTO shall not be brought into the U1a COMPLEX UNDERGROUND until the Vessel Confinement Systems from previous SCEs in the Zero Room have been entombed.

Therefore, prior to movement of the SCE or SNM DTO into the U1a COMPLEX UNDERGROUND, this SAC shall ensure that all previous SCEs in the Zero Room have been entombed. If a previous SCE remains in the Zero Room as non-entombed, the SCE or SNM DTO shall not be moved into the U1a COMPLEX UNDERGROUND.

Also, prior to movement of the SCE or SNM DTO into the U1a COMPLEX UNDERGROUND, this SAC shall ensure that the SNM DTO has been removed from the U1a COMPLEX UNDERGROUND. If a previous SNM DTO remains in the Zero Room, an SCE or SNM DTO shall not be moved into the U1a COMPLEX UNDERGROUND.

5.7.3 Explosives Inventory Limits

The type and quantity of explosives used in each experiment shall be less than or equal to (b) (7) (E) TNT-equivalent for a 3-ft vessel and less than or equal to (b) (7) (E) TNT-equivalent for a 6-ft vessel.

(continued)

5.7 Specific Administrative Controls (continued)

5.7.4 Button-Up Activities

A procedure or checklist shall be in place to verify that the following Button-Up actions and activities have been performed prior to the execution of an experiment:

1. Sweep the Zero Room to ensure that all personnel have exited the Zero Room.

2. Close the (b) (7)(E) Plug #1 and Plug #2 doors and pressure-test the door seals. All pressure-test instrumentation shall be calibrated and maintained per an approved measurement and test equipment (M&TE) program.

3. Place all ventilation system penetration isolation valves for the Zero Room in the required closed configuration and ensure environmental seals are installed in support of the Zero Room containment function. This includes all isolation valves for the Post-Execution Ventilation System (two valves each for the grout lines, HEPA [high-efficiency particulate air] exhaust duct, and HEPA supply duct) and two T-bolt hinged, gasketed closures each on the 20-inch (in.) and 36-in. Air Vents (one per vent inside the Zero Room and one per vent outside).

5.7.5 Combustible Material Control

The overall average fixed and transient combustible loading shall be limited to less than 12.5 lb/ft^2 for the (b) (7)(E) AREA, (b) (7)(E), drifts where the SCE or SNM DTO transitions during transfer into the Zero Room, and in the Zero Room.

5.7.6 Critical Lift

A critical lift with HE, including the SCE Container lid removal activity, shall be performed per the M&O Hoisting and Rigging Program and/or NWL requirements for Hoisting and Rigging activities. In addition, perform an independent verification as part of the Critical Lift Plan to provide further assurance that the critical lift with HE will be planned per M&O Contractor and/or NWL critical lift requirements.

5.7.7 Entombed Material Protection

To avoid impacting entombed vessels in the (b) (7)(E), work planning shall be used prior to conducting intrusive mechanized operations (e.g., mining, long hole drilling such as core drilling) in the U1a Complex. The work planning shall involve development of specific procedures(s) that shall be used to avoid impacting entombed vessels.

(continued)

5.7 Specific Administrative Controls (continued)

5.7.8 FIREWATCH

A FIREWATCH shall be present when (1) personnel are present in the Zero Room and the SNM DTO is not inside a Type B shipping container, (2) personnel are present in the Zero Room and the SCE is not inside the Vessel Confinement System with top closure plate in place and secured, or (3) an SCE Container containing the SCE is being handled at the (b) (7) (E) AREA or in the drifts. The FIREWATCH shall meet the following requirements:

1. The individual has successfully completed general employee and fire extinguisher training and has been briefed by the U1a Facility Manager/designee in their duties, including:
   a. Observing their assigned area for indications of fire, smoke, and/or a buildup of combustible materials.
   b. Using a fire extinguisher to suppress a fire if it is in the incipient stage and the employee feels it is safe to do so. Fire extinguisher must meet applicable Fire Protection Program requirements.
2. While providing a FIREWATCH, the assigned individual will have no other duties and will have a fire extinguisher in their possession.

Qualification and training of personnel will be per CCD-QA02.001 (NSTec 2016), PLN-1016 (MSTS 2019) and JLON-PLA-800 (JLON 2018). Additional qualification and training information is provided in DSA Chapter 12.

5.7.9 Ignition Source Control

During SCE or SNM DTO transfer operations, no open flames, spark-producing activities, or exposed heating elements shall be allowed in the Experiment Insertion Path and in the Zero Room.

5.7.10 Limited Concurrent Activities

Operations shall be restricted in the vicinity of the SNM (e.g., no vehicle, including the transport vehicle, or powered equipment movement is allowed other than the operation of the tug and designated forklift).

5.7.11 Reentry Practices

1. Methods such as air quality and gas sampling shall be used to determine the hazards that may be in the Zero Room and to ensure that adequate protection for the reentry team is provided.
2. The pressure-indicating device shall be examined prior to and following Vessel Confinement System depressurization. A slight negative pressure shall be used to check confinement after venting.

(continued)

5.7 Specific Administrative Controls (continued)

5.7.12 Release to Transfer

The SCE Test Director or designee shall authorize the transfer of the SCE to/from the U1a Complex, taking into account the route conditions (e.g., range fires, high winds, and lightning conditions).

5.7.13 SCE Operations Walkdown

Perform a physical walkdown of the Experiment Insertion Path to recognize potential accident hazards (combustibles, ignition sources, electrical sources, or unnecessary equipment) and to reduce or eliminate those hazards prior to the actual movement and operations involving the SCE.

5.7.14 Deleted

5.7.15 Spotters for SCE Container Movements

Movements of the SCE Container containing an SCE will be observed and guided by having at least two spotters to alert drivers or equipment operators of potential hazards during loading/unloading and movement of the SCE Container containing an SCE.

5.7.16 Timing and Firing Capacitor Discharge Unit Arming Signal Disconnect

The T&F CDU Arming Signal Disconnect shall include the following elements:

1. Ensure the Arm & Fire Safety Key is in the 'OFF' position.
2. Ensure the Safety Relay Chassis relays are in their default bleed resistor settings.
3. Ensure the Arm & Fire Safety Key is administratively controlled by the NWL Firing Site Leader upon removal.

5.7.17 (b) (7)(E) ~~Equipment Inspection~~ (Deleted)

5.7.18 (b) (7)(E) ~~Operability Testing~~ (Deleted)

(continued)

5.7 Specific Administrative Controls (continued)

5.7.19 Use of Approved Electrical Test Instruments

Ensure that electrical test instruments used for SCE Operations comply with DOE-STD-1212-2012, *Explosives Safety* (DOE 2012b), and have been deemed incapable of applying unsafe electrical energy to the SCE and are approved for use by the LLNL High Explosives Instrument Committee or the LANL Explosives Instrument Review Committee.

5.7.20 ~~Use of LIEMP Covers~~ (Deleted)

5.7.21 Qualified Explosives Handlers

Explosives operations will be supervised and/or conducted by qualified explosives handlers to reduce the likelihood of an explosion.

Explosives handlers are qualified to DOE-STD-1212-2012 (DOE 2012b) to ensure that the handling of explosives complies with applicable rules and procedures. The training is documented in an Explosives Training Qualification Record or equivalent and maintained by the home organization's Training Records.

Qualification of personnel will be per CCD-QA02.001 (NSTec 2016), PLN-1016 (MSTS 2019), and JLON-PLA-800 (JLON 2018). Additional qualification information is provided in DSA Chapter 12.

5.7.22 Use of High-Energy Initiators for Subcritical Experiments

Only high-energy initiators (e.g., exploding bridgewire [EBW] or exploding foil [slapper] detonators) shall be used for SCEs at the U1a Complex. This SAC reduces the likelihood of an HEVR resulting from an EMI, ESD, or radio frequency applied to a SCE. High-energy initiators are high-power devices typically requiring peak power levels of 10^5 to 10^6 watts to give a detonation output. These high-energy initiators will not be activated by an EMI, ESD, or radio frequency, which prevents an EMI, ESD, or radio frequency from causing an HEVR.

5.7.23 (b) (7)(E) Speed

1

(b) (7)(E)

This SAC reduces the likelihood of an impact of the hoist cage with the sheave deck or bottom of the shaft leading to an HEVR. (b) (7)(E) will provide enough distance for the track limit switches and braking system to stop the hoist without impact during an overtravel condition.

5.8 Interface with Technical Safety Requirements from Other Facilities

NNSS activities external to the U1a Complex that might affect safety SSCs or the safety of operations shall be coordinated with operations.

5.8.1 Onsite Transportation Safety Document

Following is a list of the safety basis documents for DOE's transportation activities that must be considered for their interfaces with applicable activities (e.g., shipping/receiving, unpacking, and packing) at the (b) (7)(E) Area.

5.8.1.1 Transportation-Related Safety Bases

- OTSD-NSAF.100, Nuclear Onsite Transportation Safety Document for the Nevada National Security Site (MSTS 2018c)

5.8.1.2 U.S. Department of Transportation Package-Related Safety Bases

Each SARP is a U.S. Nuclear Regulatory Commission (NRC)-approved safety basis document that has requirements involving the use of DOT Type B packages to ensure compliance with 10 CFR 71. DOE has approved the use of the certified Type B Shipping Containers for transport of SNM material. Safety analysts must consider the interface of a SARP with the safety basis documents. For example, experiment packing and unpacking procedures must implement the requirements specified in Chapter 7, "Operating Procedures," of the applicable SARP. Information about the packages and SARPs is available online at http://www.doeal.gov/nnsaota/. Additional packages addressed by DOE-approved NRC SARPs may be used at the U1a Complex. Following are the SARPs for some of the packages that could be received at the U1a Complex for experiments:

- (Model FL) *Safety Analysis Report for Packaging, Model FL Package (U)*, CDOT-96-0648, Rev. 2, March 22, 2002.
- (DT-22) *Safety Analysis Report for Packaging, Oak Ridge Y-12 Plant, Model DT-22 Package with HEU Metal Contents (U)*, Y/LF-612/R1, June 10, 2002.
- (DT-23) *Safety Analysis Report for Packaging, Oak Ridge Y-12 Plant, Model DT-23 Package with HEU Metal Contents (U)*, Y/LR-690/R1, November 24, 2003.
- (DPP-2) *Safety Analysis Report for Packaging, Y-12 National Security Complex, Model DPP-2 Package with Highly Enriched Uranium and Plutonium Metal Contents (U)*, Y/LF-755, April 17, 2006.

5.8.2 TECHNICAL SAFETY REQUIREMENTS

SCE activities shall be considered for their interfaces with applicable activities (e.g., shipping/receiving, unpacking, and packing) from the (b) (7)(E) Area to the Zero Room and final SCE entombment within the (b) (7)(E) entombment area. Interface activities shall be evaluated per CD-NENG.019, *Unreviewed Safety Question Process* (MSTS 2018d).

5.8.3 U1A COMPLEX HAZARD ANALYSIS

When the U1a Complex DSA/TSRs are no longer applicable, protection of the entombed experiment components in the Zero Room entombment feature shall be provided under the existing controls in the *U1a Complex Hazard Analysis* (NSTec 2015) that protect similar entombed products from other previous SCEs.

References

10 CFR 830. *Safety Basis Requirements*. Title 10 CFR Part 830, Subpart B, U.S. Department of Energy, Washington, D.C.

DOE 2012a. *Environment, Safety and Health Reporting*. DOE O 231.1B, U.S. Department of Energy, Washington, D.C., November 2012.

DOE 2012b. *Explosives Safety.* DOE-STD-1212-2012, U.S. Department of Energy, Washington, D.C., June 2012.

DOE 2014. *Conduct of Operations*. DOE O 422.1, Change 2, U.S. Department of Energy, Washington, D.C., December 2014.

DOE 2015. *Implementation Guide for Use in Developing Technical Safety Requirements.* DOE G 423.1-1B, U.S. Department of Energy, Washington, D.C., March 2015.

JLON 2018. *JLON Nuclear Operations Training & Qualification Program Plan.* JLON-PLA-800 (or successor document), Joint Laboratory Office – Nevada, Las Vegas, NV.

MSTS 2018a. *Integrated Nuclear Criticality Safety Program Description*. PD-NOPS.003, Mission Support and Test Services, LLC, Las Vegas, NV.

MSTS 2018b. *Nevada National Security Site Radiological Control Manual*. DOE/NV/3624--0257, Mission Support and Test Services, LLC, Las Vegas, NV, October 2018.

MSTS 2018c. *Nuclear Onsite Transportation Safety Document for the Nevada National Security Site*. OTSD-NSAF.100, latest version, Mission Support and Test Services, LLC, Las Vegas, NV.

MSTS 2018d. *Unreviewed Safety Question Process*. CD-NENG.019, Rev. 8 (or successor document), Mission Support and Test Services, LLC, Las Vegas, NV, June 4, 2018.

MSTS 2019. *Nevada National Security Site (NNSS) Integrated Implementation Matrix TIM) for DOE O 426*.2. PLN-1016 (or successor document), Mission Support and Test Services, LLC, Las Vegas, NV.

NSTec 2016. *Training Program Manual.* CCD-QA02.001 (or successor document), National Security Technologies, LLC, Las Vegas, NV.

Section 6
Design Features

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6.0 DESIGN FEATURES

6.1 Purpose

The purpose of this section is to identify those passive engineered features identified as Safety-Significant (SS) SSCs that if altered or modified could have a significant effect on safety. Any process that might alter, modify, or affect the functions of the systems or components listed shall be evaluated for the potential safety effects per approved administrative programs. All changes or modifications are subject to the USQ process.

The purpose of this section is to ensure that the passive safety functions identified in the DSA are protected, maintained, and controlled through the implementation of the functional requirements defined for each of these SSCs. For each DF, the functional requirement is explicitly identified and protected in a controlled manner through the Configuration Management Program (change control and USQ process) and maintained through the Maintenance Program. The Configuration Management Program is discussed in Section 5.6.2.

Testing and ISIs, as part of the Maintenance Program, ensure compliance with the functional requirements identified for safety SSCs. The following generic issues are applicable to the inspections and surveillances of DFs in this TSR document:

1. Performance of the inspections shall be documented.
2. Unless otherwise noted by the ISI interval for each DF, the interval requirement for ISIs is based on considerations of system use, amount of modification, repair history, the occurrence of man-made or natural events since the last inspection that might affect the condition of the DF and the DF condition at the time of the last inspection. This interval should not exceed the manufacturer's requirements or standard industry practices.
3. Exceeding the interval for an inspection is considered a procedural deficiency of the ISI and the Maintenance Program, and it is not considered a violation of the TSR unless it becomes an endemic failure of the program itself.
4. Corrective measures to be completed when functional requirements identified for the safety SSCs are not met (nonconformance) are either covered by an implementation plan approved by NNSA or contained in the procedural implementation of the ISIs and the Maintenance Program.

Detailed descriptions of these features are provided in Chapters 2 and 4 of the DSA.

6.2 Safety-Class SSC Design Features

No SC-SSCs are identified because the evaluation guideline of 25 rem [roentgen equivalent man] to the maximum exposed offsite individual is not challenged.

6.3 Safety-Significant SSC Design Features

The following systems are identified as SS-SSC DFs:

1. Material Form
2. ~~Sealed SNM~~ (DELETED)
3. SCE Container
4. Type B Shipping Container
5. Vessel Confinement System
6. ~~Vessel Pressure Relief System (VPRS)~~ (DELETED)
7. Post-Execution Ventilation System
8. Zero Room Structure

6.3.1 Material Form

The SNM (SCE or DTO) shall be solid metal at manufacture.

MODE
APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

The ISI and associated performance interval are stated in Table 6-1.

Table 6-1. Material Form In-Service Inspection

In-Service Inspection	Interval
VERIFY via documentation that the material form of the SNM (DTO or SCE) is solid metal at manufacture.	Prior to acceptance at (b) (7)(E) AREA

6.3.2 ~~Sealed Special Nuclear Material~~ (DELETED)

Table 6-2. ~~Sealed Special Nuclear Material In-Service Inspection~~ (DELETED)

(continued)

6.3 Safety-Significant SSC Design Features (continued)

6.3.3 SCE Container

The SCE Container has been certified per the SCE Container Certificate of Compliance to meet the requirements of U.S. Department of Transportation (DOT) 7A Type A as defined by 49 CFR 173, *Shippers – General Requirements for Shipments and Packagings*, Subsections .24, .410, .412, .415, .461 and .465.

MODE
APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

The ISIs and associated performance intervals are stated in Table 6-3.

Table 6-3. SCE Container In-Service Inspection

In-Service Inspection	Interval
1. VERIFY that SCE Container per the SCE Container Certificate of Compliance has been certified to meet the requirements of DOT 7A Type A as defined by 49 CFR 173, Subsections .24, .410, .412, .415, .461 and .465. Applicable for all receipts of an SCE.	Upon receipt at (b) (7)(E) AREA
2. Visually inspect the SCE Container to ensure the container is intact, undamaged, and forms a continuous containment (no breaks, punctures, or tears). Applicable for all receipts of an SCE.	Upon receipt at (b) (7)(E) AREA

Bases: The safety function of the SCE Container is to provide protection from mechanical impacts to the SCE.

(continued)

6.3 Safety-Significant SSC Design Features (continued)

6.3.4 Type B Shipping Container

The Type B Shipping Container is a robust container and shall be certified to meet the requirements of 49 CFR 173. The Type B Shipping Container must be approved for use for the material form, quantity, and isotope by the applicable Safety Analysis Report for Packaging (SARP). The container must be designed, constructed, and tested per the requirements of 10 CFR 71, *Packaging and Transportation of Radioactive Material*.

MODE

APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

The ISIs and associated intervals are stated in Table 6-4.

Table 6-4. Type B Shipping Container In-Service Inspection

In-Service Inspection	Interval
1. VERIFY that the Type B Shipping Container is certified to meet the requirements of 49 CFR 173. Check that the Type B Shipping Container is approved for use for the material form, quantity, and isotope by the applicable SARP. Applicable for all receipts of SNM DTOs.	Upon receipt at (b) (7)(E) AREA
2. Visually inspect the Type B Shipping Container to ensure the container is intact, undamaged, and forms a continuous containment (no breaks, punctures, or tears). Applicable for all receipts of SNM DTOs.	Upon receipt at (b) (7)(E) AREA

Bases: The safety function of the Type B Shipping Container is to withstand fires and impacts without significant damage, preventing insult to the SNM DTO. The Type B Shipping Container and loading (packaging) requirements provide two containment barriers for the SNM.

(continued)

6.3 Safety-Significant SSC Design Features (continued)

6.3.5 Vessel Confinement System

MODE

APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

The ISIs and associated performance intervals are stated in Table 6-5.

Table 6-5. Vessel Confinement System In-Service Inspection

In-Service Inspection	Interval
1. VERIFY by means of a helium leak check that the vessel integrity has a leak rate less than 1.0×10^{-5} atm cc/s.	After final assembly and prior to execution
2. VERIFY that the vessel is qualified in accordance with the requirements of ASME Boiler and Pressure Vessel Code; Section VIII Div. 3, Code Case 2564.	Prior to execution
3. VERIFY that the in-line filters meet a minimum filtration efficiency of 99.97 percent for particles of greater than or equal to 0.3 µm or equivalently tested.	Upon initial receipt

Bases: The safety function of the Vessel Confinement System is to provide confinement for the SNM (prior to and during experiment execution and post-execution) and to protect the spent experiment material from external hazards (post-execution). The VCS contains in-line filters for confinement. The filtering level is based on the filtration efficiency requirements identified in the DOE-HDBK-1169-2003, *Nuclear Air Cleaning Handbook,* Section 8.4.

1

6.3.6 ~~Vessel Pressure Relief System~~ (DELETED)

Table 6-6. ~~Vessel Pressure Relief System In-Service Inspection~~ (DELETED)

(continued)

6.3 Safety-Significant SSC Design Features (continued)

6.3.7 Post-Execution Ventilation System

The isolation valves on the Post-Execution Ventilation System must reduce the release of radioactive material and withstand a pressure differential of up to 1 pound per square inch (psig).

MODE

APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

The ISI and associated interval are stated in Table 6-7.

Table 6-7. Post-Execution Ventilation System In-Service Inspection

In-Service Inspection	Interval
VERIFY that the Post-Execution Ventilation System passed a pressure test (1 psig minimum) for the closure valves.	Within 1 year prior to the execution of each SCE

Bases: The safety function of the Post-Execution Ventilation System is to reduce the release of radioactive material from the Zero Room in support of the Zero Room Structure and Button-Up Activities. The Post-Execution Ventilation System isolation valves are closed in the Experiment Execution Configuration during Button-Up Activities.

(continued)

6.3 Safety-Significant SSC Design Features (continued)

6.3.8 Zero Room Structure

Zero Room Structure reduces the release of any radiological material to the remainder of the U1a Complex underground.

MODE

APPLICABILITY: EXPERIMENT ACTIVE OPERATIONS

The ISI and associated interval are stated in Table 6-8.

Table 6-8. Zero Room Structure In-Service Inspection

In-Service Inspection	Interval
VERIFY that the Zero Room Structure and penetrations (e.g., door seals, environmental seals, chilled water lines, cable pass-throughs, and isolation valves) passed a pressure test (2 psig minimum) and that all modifications have been leak tested.	Within 1 year prior to the execution of each SCE

Bases: The safety function of the Zero Room Structure is to reduce the release of any radiological material to the remainder of the U1a Complex underground. The Post-Execution Ventilation System in the Experiment Execution Configuration supports this function. This feature works in conjunction with Zero Room Button-Up Activities to assure that the Zero Room Structure is functional post Button-Up and prior to Reentry.

(continued)

References

10 CFR 71. *Packaging and Transportation of Radioactive Material*. Title 10 CFR Part 71, U.S. Government Publishing Office, Washington, D.C.

49 CFR 173. *Shippers – General Requirements for Shipments and Packagings*. Title 49 CFR Part 173, U.S. Government Publishing Office, Washington, D.C.

ASME Code Case 2564. *Impulsively-loaded Pressure Vessels*. ASME Code Case 2564, American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 3.

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Appendix A
Bases

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A3/4.0 APPLICABILITY

A3.0 Limiting Control Settings and Limiting Conditions for Operation

BASES

GENERAL	LCOs 3.0.1 through 3.0.5 establish the general requirements applicable to all LCOs at all times, unless otherwise stated. The general requirements contained in LCOs 3.0.1–3.0.5 provide overall rules to guide the use and application of the specific requirements of the LCOs in Section 3.0 of the TSRs. When exceptions to the general requirements contained in LCOs 3.0.1–3.0.5 are allowed, they are stated as notes in the individual LCO.
LCO 3.0.1	LCOs Shall Be Met LCO 3.0.1 establishes the applicability statements within each LCO as the requirement for conformance to the LCO. This statement indicates that the LCO is only required to be met when the criteria in the applicability statement are met. However, if the applicability statement is met, the LCO must also be met. This ensures safe operation of the facility. The Required Actions establish the remedial measures that must be taken within specified Completion Times when required LCOs are not met as required by LCO 3.0.2. An SR that requires the removal of equipment from service does not constitute failure to meet an LCO. Individual procedures shall describe the appropriate limitations beyond which an out-of-tolerance condition would exist. Measurement devices used to demonstrate compliance with LCOs shall be calibrated to plant design, manufacturer's specifications, and/or industry standards as described in the M&TE Calibration Program.
LCO 3.0.2	LCO ACTIONS Shall Be Met LCO 3.0.2 establishes that, on discovery of a failure to meet an LCO, the associated Required Actions shall be met within the specified Completion Time. The Completion Time of each Required Action is applicable from the TIME OF DECLARATION (see Section 1.6, "Completion Times"). The Required Actions establish those remedial measures that shall be taken within specified Completion Times when the requirements of an LCO are not met.

(continued)

A3.0 Limiting Control Settings and Limiting Conditions for Operation (continued)

BASES

LCO 3.0.2 (continued)

This LCO establishes that:

- Completion of the Required Actions within the specified Completion Times constitutes compliance with an LCO; and
- Completion of the Required Actions is not required when an LCO is met within the specified Completion Time, unless otherwise stated.

There are two basic types of Required Actions. The first type of Required Actions specifies a time limit in which the LCO shall be met or additional action is needed. This time limit is the Completion Time to restore an INOPERABLE system or component to OPERABLE status. If this type of Required Action is not completed within the specified Completion Time, it may be required to place the applicable AREA into a MODE or other safe condition in which the LCO is not applicable. Whether stated as a Required Action or not, the restoration of INOPERABLE equipment or a Condition to within limits is an action that may always be considered on entering LCO ACTIONS.

Some LCO Required Actions of the first type specify a Completion Time to initiate actions to place the SCE in a specified MODE or other safe condition. This wording allows SCE operations a reasonable amount of time to determine what actions are necessary, to determine the correct course of action to safely perform the necessary actions, and to perform any necessary administrative functions associated with the actions. When Completion Times were not specified for completion of the SCE reconfiguration or MODE change in order to allow reasonable operational flexibility, the intent is not to delay placing the SCE in a safe condition or MODE. Necessary actions should be completed in a minimum timeframe and should not be extended for operational convenience.

The second type of Required Action specifies remedial measures that permit continued operation of the SCE not further restricted by the Completion Time. In this case, conformance to the Required Action provides an acceptable level of safety for continued operation.

Completion of a Required Action is not required when an LCO is met or is no longer applicable within the associated Completion Times, unless otherwise stated in the individual LCO.

The nature of some Required Actions for some Conditions necessitates that, once the Condition is entered, the Required Actions shall be completed even though the associated Conditions are resolved. The ACTIONS of the individual LCOs specify where this is the case.

(continued)

A3.0 Limiting Control Settings and Limiting Conditions for Operation (continued)

BASES

LCO 3.0.2 (continued)

The Completion Times of the Required Actions are also applicable when a system or component is intentionally taken out of service. The reasons for intentionally relying on the ACTIONS include, but are not limited to, the performance of SRs, preventative maintenance, corrective maintenance, or the investigation of operational problems. ACTIONS for these reasons shall be performed in a manner that does not compromise safety. It is not intended that ACTIONS be intentionally entered for operational convenience. This requirement is to limit routine, voluntary removal of redundant or standby equipment from service in lieu of other alternatives that would result in redundant or standby equipment being OPERABLE. This limits the time that subsystems of a safety system are INOPERABLE. It also limits the time that other conditions exist that result in LCO 3.0.3 being entered. Individual LCOs may specify a time limit for performing an SR when equipment is taken out of service or bypassed for testing. In this case, the SR must be completed before the Completion Time of the Required Action expires. If the SR completion time exceeds the Completion Times, then the applicable Required Action must be completed.

When a change in a specified operating configuration is required to comply with ACTIONS, the SCE may enter a specified operating configuration in which a new LCO becomes applicable. In this case, the Completion Times of the associated Required Actions would apply from the time that the new LCO becomes applicable, and any Condition(s) is entered.

LCO 3.0.3

LCO ACTION Not Met or Not Provided

LCO 3.0.3 establishes the ACTIONS that shall be implemented and when, for an LCO that is not met:

- Associated Required Actions and Completion Times are not met and no other Condition applies; and
- The condition of the SCE is not specifically addressed by the associated ACTIONS. This means that no combination of Conditions stated in the ACTIONS corresponds exactly to the actual condition of the SCE. Sometimes possible combinations of conditions are such that entering LCO 3.0.3 is warranted. In such cases, the ACTIONS specifically state a condition corresponding to such combinations and also that LCO 3.0.3 must be entered.

(continued)

A3.0 Limiting Control Settings and Limiting Conditions for Operation (continued)

BASES

LCO 3.0.3 (continued)

This LCO is intended to provide a "safe-harbor" provision when either the Required Action cannot be complied with, or a Required Action cannot be complied with within the specified Completion Time when an LCO is not met by forcing the SCE to enter the EXPERIMENT COLD STANDBY MODE. The EXPERIMENT COLD STANDBY MODE requires the removal of the SNM. While in the pre-execution phase of the SCE, this is accomplished by physically removing the SNM from the U1a COMPLEX UNDERGROUND to outside the (b) (7)(E) AREA fence. In the post-execution phase of the SCE, physical removal of the SNM is not an option, and therefore "removal" of the SNM is accomplished by way of entombment, either in the planned entombment area or by grouting in the entire Zero Room depending on analysis of the existing situation.

LCO 3.0.3 also provides a default action when the SCE is in a condition that is indeterminate or is not readily categorized into the specified limits of an LCO. Entry into LCO 3.0.3 and completion of the associated actions within the required Completion Time does not in and of itself constitute a violation of a TSR.

This LCO delineates the time limit to initiate an action for placing the SCE in a safe operating configuration when operation cannot be maintained within the limits for safe operation, as defined by the LCO and its ACTIONS. It is not an operational convenience that permits routine, voluntary removal of redundant or standby systems or components from service in lieu of other alternatives that would result in redundant or standby systems or components being OPERABLE.

Upon entry into LCO 3.0.3, 1 hr is allowed to initiate actions to permit the change to proceed in a controlled and orderly manner that is well within the capabilities of the SCE. This reduces the potential for an SCE upset that could challenge safety systems under operating conditions to which this LCO applies. Efforts shall be continued until the mode change is achieved, or the LCO is no longer applicable.

A change in SCE operation required per LCO 3.0.3 may be terminated and LCO 3.0.3 exited in an orderly manner, if any of the following occurs:

- The LCO is now met;
- A Condition exists for which the Required Actions have been performed; and

(continued)

A3.0 Limiting Control Settings and Limiting Conditions for Operation (continued)

BASES

LCO 3.0.3 (continued)

- Required Actions exist that do not have expired Completion Times. These Completion Times are applicable from the point in time that the Condition was initially entered, and not from the time LCO 3.0.3 is exited.

The exceptions to LCO 3.0.3 are provided in instances where requiring an SCE change per LCO 3.0.3 would not provide appropriate remedial measures for the associated Condition of the SCE. These exceptions, if any, are addressed in the individual LCOs.

LCO 3.0.4

MODE Changes

LCO 3.0.4 establishes the limitations on changes in MODES or other operating condition specified in the applicability statement when an LCO is not met. It precludes placing the SCE in a different MODE or other specified operating condition when the following exists:

- The requirements of an LCO in the MODE or other specified operating condition to be entered are not met.

Compliance with ACTIONS that permit continued operation of the SCE for an unlimited period of time in an applicable MODE or other specified operating condition provides an adequate level of safety for continued operation, without regard for the status of the SCE before or after the MODE change. Therefore, in such cases, entry into a MODE or other operating condition specified in the applicability statement may be made per the provisions of the ACTIONS. The provisions of this LCO shall not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before startup.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified operating conditions in the applicability statement that is required to comply with ACTIONS.

Exceptions to LCO 3.0.4, if any, are stated in the individual LCOs. Exceptions may apply to all the Required Actions or to a specific Required Actions of an LCO.

When changing MODES or other specified operating conditions while in a Condition (in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated), the Required Actions define the remedial measures that apply. SRs do not have to be performed on the associated

(continued)

A3.0 Limiting Control Settings and Limiting Conditions for Operation (continued)

BASES

LCO 3.0.4 (continued)	INOPERABLE equipment, as permitted by SR 4.0.1. Therefore, a change in MODE or other specified operating condition in this situation does not violate SR 4.0.1 or SR 4.0.4 for those SRs that do not have to be performed because of the associated INOPERABLE equipment. However, SRs shall be met to demonstrate OPERABILITY before declaring the associated equipment OPERABLE and restoring compliance with the affected LCO.
LCO 3.0.5	Return to Service LCO 3.0.5 establishes the allowance of restoring equipment to service under administrative/procedural controls when it has been removed from service or declared INOPERABLE to comply with ACTIONS. The sole purpose of this LCO is to provide an exception to LCO 3.0.2 to allow the performance of SRs to demonstrate the following: • OPERABILITY of the equipment being returned to service; or • OPERABILITY of other associated equipment. Administrative controls are to ensure that the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the allowed SR. This LCO does not provide time to perform any other preventive or corrective maintenance.

A3/4.0 APPLICABILITY

A4.0 Surveillance Requirements

BASES

BACKGROUND SUMMARY	SRs 4.0.1 through 4.0.4 establish the general requirements applicable to all SRs and apply at all times, unless otherwise stated. The general requirements contained in LCOs 4.0.1 through 4.0.4 provide overall rules to guide the use and application of the specific requirements of the LCOs in Section 4.0 of the TSRs. When exceptions to the general requirements contained in LCOs 4.0.1 through 4.0.4 are allowed, they are stated as notes in the individual LCO.
SR 4.0.1	SURVEILLANCE REQUIREMENTS Shall Be Met SR 4.0.1 establishes the requirement that SRs must be met during the MODES or other specified operating conditions in the applicability statements for individual LCOs unless otherwise stated in the individual SRs. This SR ensures that individual SRs are performed to VERIFY the OPERABILITY of systems and components. Failure to meet an SR within the specified frequency, per SR 4.0.2, constitutes a failure to meet an LCO. Systems and components are assumed to be OPERABLE when the associated SRs have been met. Nothing in this SR, however, is to be construed as implying that systems or components are OPERABLE when: • The systems or components are known to be INOPERABLE, although still meeting the SRs; or • The requirements of the SRs are known not to be met between required SR performances. SRs do not have to be performed when the U1a Complex is in a MODE or other specified operating condition for which the requirements of the associated LCO are not applicable, unless otherwise specified. SRs, including SRs invoked by ACTIONS, do not have to be performed on INOPERABLE equipment because the sole purpose of an SR is to determine OPERABILITY. If the equipment has been declared INOPERABLE and/or out of service, an OPERABILITY determination has already been made. Required Actions resulting from the equipment INOPERABILITY define the remedial measures that apply. SRs have to be met per SR 4.0.2 before returning equipment to OPERABLE status.

(continued)

A4.0 Surveillance Requirements (continued)

BASES

SR 4.0.1 (continued)

Measurement devices used to demonstrate compliance with LCO SRs shall be calibrated to SCE design requirements, manufacturer's specifications, and/or industry standards as described in the M&TE Calibration Program, if applicable.

SR results shall be documented in an auditable and traceable manner.

Upon completion of maintenance, appropriate post-maintenance testing is required to declare equipment OPERABLE. This testing includes meeting applicable SRs per SR 4.0.2. Post-maintenance testing may not be possible in the specified operating configuration in the applicability statement because the necessary SCE parameters were not established.

In these situations, the equipment may be considered OPERABLE, provided that testing has been satisfactorily completed to the extent possible, and that the equipment is not believed to be otherwise incapable of performing its function. This will allow the operation to proceed to a specified operating configuration where other necessary post-maintenance tests can be completed.

An SR that requires the removal of equipment from service does not constitute a failure to meet an LCO. Individual surveillance procedures shall describe appropriate limitations beyond which an out-of-tolerance situation would exist.

SR 4.0.2

SURVEILLANCE REQUIREMENT FREQUENCIES Shall Be Met

SR 4.0.2 establishes the requirements for meeting the specified frequency or non-periodic condition for surveillances. SR frequencies or non-periodic condition should be based on historical data, engineering or manufacturer's information, or safety analysis to allow the longest reasonable time between SRs to ensure OPERABILITY. Failure to perform the SRs within the specified frequencies or non-periodic conditions may allow operation beyond the assumptions specified in the DSA.

SR 4.0.3

Frequency Limits and INOPERABLE Equipment

SR 4.0.3 permits a 25% extension of the interval specified in the SR frequency. This SR is designed to facilitate SR scheduling in conditions where performance would represent an operational hardship or cause an unsafe transient. It allows the consideration of SCE operating conditions that may not be suitable for conducting the SR (e.g., transient states or other ongoing SRs or maintenance activities).

(continued)

A4.0 Surveillance Requirements (continued)

BASES

SR 4.0.3 (continued)

The 25% extension does not significantly degrade the reliability that results from performing the SR at its specified frequency, because the most probable result of any particular SR being performed is the VERIFICATION of conformance with the SR. The exceptions to SR 4.0.3 are those SRs for which the 25% extension of the interval specified in the frequency does not apply. These exceptions are stated in the individual SRs. An example of where SR 4.0.3 does not apply is a SR with a frequency of "per another DOE regulation." The requirements of regulations take precedence over the TSRs. The TSRs cannot, in and of themselves, extend a test interval specified in the regulations. Therefore, there would be a "**Note:**" in the frequency that states "SR 4.0.3 is not applicable."

Also, this 25% allowance is not to be applied to non-periodic or conditional SRs (i.e., SRs whose frequency requires that the surveillance be performed at a particular point in time based on impending process evolutions, or equipment conditions).

The provisions of SR 4.0.3 are not intended to be used repeatedly merely as an operational convenience to extend SR intervals or periodic Completion Time intervals beyond those specified.

SR 4.0.3 establishes the flexibility to defer declaring affected equipment INOPERABLE when a SR has not been completed within the specified frequency. An extension period of up to 24 hr applies from the time the original SR frequency period has ended, per SR 4.0.2.

To avoid subjecting the SCE to unnecessary transients, upon discovery of a missed SR, 24 hr or the time limit of the specified SR frequency (including the time extension specified in Table 1-3), whichever is less, is allowed to complete the SR before entering the ACTIONS of the LCO. This extension period provides an adequate time limit to complete missed SRs. This extension period permits the completion of an SR before compliance with ACTIONS or other remedial measures would be required that may preclude completion of the SR. The basis for this extension period includes consideration of SCE operating configuration, adequate planning, availability of personnel, the time required to perform the SR, the safety significance of the extension in completing the required SR, and the recognition that the most probable result of any particular SR being performed is the VERIFICATION of conformance with the SRs. When an SR with a frequency based not on time intervals, but on specified SCE conditions or operational situations, is discovered not to have been performed when specified, SR 4.0.3 allows the full 24-hr extension period in which to perform the SR.

(continued)

A4.0 Surveillance Requirements (continued)

BASES

SR 4.0.3 (continued)

If an SR is not completed within the allowed extension period, the equipment is considered INOPERABLE, and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon expiration of the extension period. If an OPERABILITY requirement is failed within the extension period, then the equipment is INOPERABLE and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon the failure of the OPERABILITY requirement.

The provisions of SR 4.0.3 also provide a time limit for completion of SRs that become applicable as a consequence of changes imposed by ACTIONS.

Completion of the SR within the extension period allowed by this LCO, or within the Completion Times of the Required Actions, restores compliance with SR 4.0.1.

Failure to comply with specified frequencies for SRs is expected to be an infrequent occurrence. Use of the extension period established by SR 4.0.3 is a flexibility that is not intended to be used as an operational convenience to extend SR intervals. This extension also does not preclude notification of a violation of SR 4.0.2.

SR 4.0.4

MODE Changes

SR 4.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified operating condition in the applicability statements.

This SR ensures that system and component OPERABILITY requirements are met before entry into a MODE or other specified operating condition in the applicability statements for which these systems and components ensure safe operation of the SCE. This SR applies to changes in MODES or other specified operating conditions in the applicability statements associated with the SCE.

The provisions of SR 4.0.4 shall not prevent changes in MODES or other specified operating conditions in the applicability statements that are required to comply with the ACTIONS.

The precise requirements for performance of SRs are specified so that exceptions to SR 4.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs per the requirements of

(continued)

A4.0 Surveillance Requirements (continued)

BASES

SR 4.0.4 (continued)

SR 4.0.4 are specified in the frequency, in the SR, or both. This allows performance of SRs when the prerequisite conditions specified in an SR procedure require entry into the MODE or other specified operating condition in the applicability statements of the associated LCO prior to the performance or completion of an SR. An SR that could not be performed until after entering the LCO applicability statements would have its frequency specified so that it is not "due" until the specific operating configuration needed is met. Alternately, the SR may be stated in the form of a "**Note:**" as not required (to be met or performed) until a particular event, operating condition, or time has been reached.

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A3/4.1 LIMITING CONDITIONS FOR OPERATION

A3.1.1 (b) (7)(E) Control System

BASES

BACKGROUND SUMMARY	The (b) (7)(E) Control System controls the (b) (7)(E) operations. The system includes an ammeter within plain view of the hoist operator to indicate the hoist motor current; a speed indicator within plain view of the hoist operator to indicate the hoist speed and direction; a master controller that has a neutral position; and a depth indicator that continuously, accurately, and clearly shows to the hoist operator the position of the hoist cage in the shaft. The system also includes a switch that permits changing from manual to automatic control that is readily accessible to the hoist operator. The hoist control system has automatic slowdown control of the hoist cage near the limits of travel. The PLCs and track limit switches prevent the hoist cage from impact due to overtravel. The credited items associated with the (b) (7)(E) Control System are (b) (7)(E) Control System Software (firmware), Safety Braking Mechanical Components, and Safety Braking Electrical Components.
APPLICATION TO SAFETY ANALYSIS	The safety function of the (b) (7)(E) Control System is to prevent unintended travel of the (b) (7)(E) cage past the designated hoist cage stop locations when transferring an SCE between the (b) (7)(E) AREA and the (b) (7)(E). This safety function is required during EXPERIMENT ACTIVE OPERATIONS MODE while there is an SCE on the (b) (7)(E).
LCO	The (b) (7)(E) Control System is required to be OPERABLE whenever an SCE is being transported up or down the (b) (7)(E). OPERABILITY is ensured by performance of the SRs listed in this LCO.
MODE APPLICABILITY	The MODE to which this LCO is applicable (EXPERIMENT ACTIVE OPERATIONS) is appropriate because radioactive material and explosives are allowed in this MODE. The applicability of this LCO is further restricted to only when an SCE is being transported up or down the (b) (7)(E) since this is the only time that failure of the (b) (7)(E) Control System could result in an explosion event.
AREA APPLICABILITY	The AREA of applicability is the (b) (7)(E).

(continued)

A3.1.1 (b) (7)(E) Control System (continued)

BASES

CONDITION A, ACTIONS and COMPLETION TIMES

Condition A is entered when the (b) (7)(E) Control System is found to be INOPERABLE. Under this condition, Required Actions A.1 and A.2 are performed.

Required Action A.1 requires that all (b) (7)(E) operations involving an SCE, including handling, shipping, or receiving radioactive material at the (b) (7)(E) cease IMMEDIATELY. Only those activities that are required to remove the radioactive material from the (b) (7)(E) (b) (7)(E) cage or prevent entry of the radioactive material onto the (b) (7)(E) cage are permitted. Stopping all other activities reduces the likelihood of initiating an accident and facilitates bringing the radioactive material inventories under control as soon as possible. This Required Action begins IMMEDIATELY upon declaration of the Condition and is actively and continuously pursued until completion.

Required Action A.2 requires that personnel initiate actions to restore the (b) (7)(E) Control System to an OPERABLE condition. This action begins after completion of Required Action A.1 and must be completed prior to performance of hoist operations involving SNM mated with HE. This ensures that the (b) (7)(E) Control System is OPERABLE whenever an SCE is being transported up or down the (b) (7)(E).

SURVEILLANCE REQUIREMENTS

SR 4.1.1.1

The (b) (7)(E) equipment shall be visually inspected within 24 hr prior to use in moving an SCE to ensure the system can perform its safety function when required. This SR shall involve the following specific activities: (1) Verify that the hoist is free of leaks, spills, obvious wear and loose bolts; and that the anchorage is secure. (2) Verify that the brake mechanical system is free of damage, defects, or degradation. Failure to meet or perform the requirements of this SR requires entry into Condition A.

SR 4.1.1.2

The operability of the (b) (7)(E) shall be tested within 24 hr prior to use in moving an SCE to ensure the system can perform its safety function when required. This SR shall involve the following specific activities: (1) Verify that the hoist stops when brakes are applied. (2) Verify that the hoist has gone through one complete cycle of travel at the reduced speed of (b) (7)(E). Failure to meet or perform the requirements of this SR requires entry into Condition A.

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(continued)

A3.1.1 (b) (7)(E) Control System (continued)

BASES	
SURVEILLANCE REQUIREMENTS (continued)	
4.1.1.3	A test of the (b) (7)(E) safety function shall be performed annually. This SR involves testing of components required to support the (b) (7)(E) safety function. Failure to meet or perform the requirements of this SR requires entry into Condition A.
4.1.1.4	A Load Test of the (b) (7)(E) shall be performed annually. This SR involves testing of components required to support the (b) (7)(E) safety function. The test includes the mechanical components of the cage load path required to support the maximum design load. Failure to meet or perform the requirements of this SR requires entry into Condition A.
REFERENCES	N/A

A3.1.2 (b) (7)(E) Conveyance Safety Catch System

BASES

BACKGROUND SUMMARY	The (b) (7)(E) Conveyance Safety Catch System is a system designed to stop the fall of the cage in the case where the hoist wire rope loses tension. The system consists of four pairs of Safety Catches and a spring-loaded actuation system that causes the Safety Catches to engage four wooden guides when the tension on the spring is released. The spring is held in compression by a mechanical linkage to the attachment point of the wire rope to the cage. While there is tension on the wire rope, the spring is held compressed, and the Safety Catches do not contact the guides. When the wire rope tension is released, a steel beam assembly is pushed down by the compression springs, causing the Safety Catches to extend and engage the wooden shaft guides that brings the cage to a stop.
APPLICATION TO SAFETY ANALYSIS	The safety function of the (b) (7)(E) Conveyance Safety Catch System is to prevent free fall of the (b) (7)(E) and its contents, thereby mitigating the radiological consequences of a drop of the cage within the (b) (7)(E) while the cage contains SNM. The system is capable of stopping a free fall of the (b) (7)(E) with a deceleration force of less than 3.9*g*, which ensures that the shipping container is not challenged by the drop.
LCO	The (b) (7)(E) Conveyance Safety Catch System is required to be OPERABLE whenever SNM is being transported up or down the (b) (7)(E). OPERABILITY is ensured by performance of the SRs listed in this LCO. The system includes the mechanism on the cage that deploys the Safety Catches upon loss of wire rope tension and the wooden guides along the (b) (7)(E) that the Safety Catches are designed to engage in order to stop the descent of the (b) (7)(E).
MODE APPLICABILITY	The MODE to which this LCO is applicable (EXPERIMENT ACTIVE OPERATIONS) is appropriate because radioactive material and explosives are allowed in this MODE. The applicability of this LCO is further restricted to only when SNM is being transported up or down the (b) (7)(E) since this is the only time that failure of the (b) (7)(E) wire rope could result in a radiological loss of confinement event.
AREA APPLICABILITY	The AREA of applicability is the (b) (7)(E).

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(continued)

A3.1.2 (b) (7)(E) Conveyance Safety Catch System (continued)

BASES

CONDITION A, ACTIONS and COMPLETION TIMES

CONDITION A is entered when the (b) (7)(E) Conveyance Safety Catch System is found to be INOPERABLE. Under this condition, Required Actions A.1 and A.2 are performed.

Required Action A.1 requires that all (b) (7)(E) operations involving SNM, including handling, shipping, or receiving radioactive material at the (b) (7)(E) cease IMMEDIATELY. Only those activities that are required to remove the radioactive material from the (b) (7)(E) cage or prevent entry of the radioactive material onto the (b) (7)(E) cage are permitted. Stopping all other activities reduces the likelihood of initiating an accident and facilitates bringing the radioactive material inventories under control as soon as possible. This Required Action begins IMMEDIATELY upon declaration of the Condition and is actively and continuously pursued until completion.

Required Action A.2 requires that personnel initiate actions to restore the (b) (7)(E) Conveyance Safety Catch System to an OPERABLE condition. This action begins after completion of Required Action A.1 and must be completed prior to performance of hoist operations involving SNM. This ensures that the Hoist Conveyance Safety Catch System is OPERABLE whenever SNM is being transported up or down the (b) (7)(E).

SURVEILLANCE REQUIREMENTS

SR 4.1.2.1 The cage Safety Catches shall be visually inspected by a competent person within 24 hr prior to use to ensure they can perform their function when required per PD-P200.002 (MSTS 2018). The visual inspection shall include the Safety Catch linkage cotter pins and the Safety Catches. This SR may be performed as part of the Daily Shift Safety Inspections conducted as part of the U1a Complex procedures. Failure to meet or perform the requirements of this SR requires entry into Condition A.

(continued)

A3.1.2 (b) (7)(E) Conveyance Safety Catch System (continued)

BASES

SR 4.1.2.2	This SR requires the performance of a visual inspection of the cage Safety Catches and the (b) (7)(E) wooden guides, which includes getting on top of the cage to check for damage to or degradation of cage Safety Catch system components. The visual inspection of the (b) (7)(E) wooden guides includes the entire length of the shaft to ensure that the guides are not gouged, glazed, or otherwise rendered incapable of Safety-Catch engagement. The SR frequency of "within 7 days prior to use" is judged to be adequate based on PD-P200.002 requirements (MSTS 2018). This SR may be performed during the weekly shaft inspection conducted as part of the U1a Complex procedures. Failure to meet or perform the requirements of this SR requires entry into Condition A.
SR 4.1.2.3	A slack rope test of the safety catches and their activating mechanisms shall be performed within 7 days prior to use of the conveyance (MSTS 2018). For this test, the conveyance shall be suitably rested and the hoist wire rope slackened to test for the unrestricted functioning of the safety catches and their activating mechanisms. Failure to meet or perform the requirements of this SR requires entry into Condition A.
REFERENCES	MSTS 2018. *Nevada National Security Site (NNSS) Underground Facility Safety and Health Program Description*. PD-P200.002 (or successor document), Mission Support and Test Services, LLC, Las Vegas, NV.

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers

BASES

BACKGROUND SUMMARY

The (b) (7)(E) Fire Detection System is designed to detect a fire inside the (b) (7)(E) Fire Barriers, including the (b) (7)(E) (b) (7)(E), and a portion of the (b) (7)(E). The components of the (b) (7)(E) Fire Detection System required to perform its safety function include the smoke/fire detectors, the visual and audible alarms, the detection system cable located inside the (b) (7)(E) Fire Barriers, and the Fire Alarm Control panels including the power disconnect relays to the fire door magnetic catches, supply and exhaust ventilation fire/smoke dampers, and barrier wall damper motors.

The (b) (7)(E) Fire Barriers separate the (b) (7)(E) FIRE AREA and the remainder of the U1a COMPLEX UNDERGROUND. The components of the (b) (7)(E) Fire Barriers required to perform their safety function include the barrier wall, supply air fire/smoke dampers, barrier wall dampers, Fire Doors, and penetration firestop systems. The (b) (7)(E) Fire Barriers are NFPA [National Fire Protection Administration]-equivalent 2-hr rated barrier.

The (b) (7)(E) Fire Barrier is a 2-hr fire-rated barrier and entry vestibule located approximately 175 ft down the (b) (7)(E) from the (b) (7)(E) The (b) (7)(E) Fire Barrier also is a 2-hr fire-rated entry vestibule located approximately 50 ft down the (b) (7)(E) from the (b) (7)(E). The fire barriers have a minimum fire resistance rating of 2 hr, with openings protected by equivalently rated fire doors, dampers, or penetration seals. Per the FHA [Fire Hazards Analysis] (MSTS 2018), the subterranean cable chase conduit openings within the concrete vaults at the junction of the (b) (7)(E) Fire Barriers have been sealed with listed/approved 2-hr fire-rated through-penetration firestop systems. The fire doors, supply and exhaust ventilation fire/smoke dampers, and barrier wall dampers are normally in the open position. Upon receipt of the appropriate signal from the (b) (7)(E) Fire Detection System, the fire doors are automatically closed by de-energizing the electromagnetic door latches. The fire doors include crash bars to permit personnel exit compliant with life-safety code requirements. The supply and exhaust ventilation fire/smoke dampers and barrier wall dampers are closed by de-energizing the damper control electric motors.

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

BACKGROUND SUMMARY (continued)	If a fire is detected in this fire area, the interlocks isolate the area from the rest of the U1a Complex using a system of fire doors, dampers, and ventilation system controls. Fire detection automatically alarms in each drift in this fire area and sends an interlock alarm signal to the Fire Alarm Control Panel, which automatically initiates the closure of the (b) (7)(E) Fire Barrier fire doors, supply and exhaust ventilation fire/smoke dampers, and barrier wall dampers, isolating the (b) (7)(E) FIRE AREA from the remainder of the U1a Complex.
APPLICATION TO SAFETY ANALYSIS	The (b) (7)(E) Fire Detection System is relied upon to alert the worker to a fire by a visual/audible alarm within the (b) (7)(E) Fire Area. The safety function of the (b) (7)(E) Fire Barriers is to limit fire, heat and smoke migration from the (b) (7)(E) Fire Area to the remainder of the U1a Complex underground. Having the (b) (7)(E) Fire Detection System and/or (b) (7)(E) Fire Barriers INOPERABLE increases the risk of a fire causing a release of radiological material. The actions identified under the CONDITIONS, ACTIONS, and COMPLETION TIMES address this increased risk and provide times and locations, which will minimize this increase in risk. The BASES for the CONDITION statements below provide the supporting information to address the acceptability of this condition. The Fire Detection System and Fire Barriers are SS SSCs specified in the *Request for Exemption from DOE O 420.1B Fire Protection Design Requirements for the Nevada National Security Site U1a Complex*, as approved by *Relief from Department of Energy (DOE) Facility Safety Order Requirements for Fire Suppression in the U1a Complex* (NSTec 2012).
LCO	The (b) (7)(E) Fire Detection System and (b) (7)(E) Fire Barriers shall be OPERABLE. OPERABILITY is ensured by performance of the applicable surveillance requirements listed in this LCO.
MODE APPLICABILITY	The MODE to which this LCO is applicable is: "EXPERIMENT ACTIVE OPERATIONS." This is appropriate because radioactive material and explosives are allowed into the U1a Complex in this MODE, but this LCO is not required to be in effect until SNM is actually within the AREA of applicability, and the intended destination of the SNM is the (b) (7)(E) FIRE AREA.
AREA APPLICABILITY	Within the fence at the (b) (7)(E) AREA and U1a COMPLEX UNDERGROUND.

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION A, ACTIONS and COMPLETION TIMES

Condition A is entered when the (b) (7)(E) Fire Detection System and/or the (b) (7)(E) Fire Barriers are INOPERABLE, **AND** the SNM is outside the (b) (7)(E) FIRE AREA.

Required Action A.1 gives a choice of three options. Required Action A.1 is satisfied by the performance of either Required Actions A.1.1, A.1.2, or A.1.3.

Required Action A.1.1 allows that if the SNM is in a SECURED SHIPPING CONTAINER, it may be moved to the surface outside of the (b) (7)(E) AREA fence and TRANSIENT COMBUSTIBLES in the area are removed. Once the SNM is outside of the (b) (7)(E) AREA fence, this LCO no longer applies as the MODE APPLICABILITY would no longer be met. One day is allowed to perform this Required Action.

Allowance of one day to move the package to the appropriate location (as defined by the action statements) is based on several factors. First, should this occur at the end of a shift, the one-day allowance provides time to return a transport vehicle and its crew to the (b) (7)(E) AREA and remove the package or operations to make corrective actions deemed appropriate by the SCE Test Director before the move is completed. Secondly, a one-day allowance provides the SCE Test Director time to assess the situation in the underground and to make a determination as to the best safe location for the package. Thirdly, the chance of a fire that would affect the SNM occurring during this one-day period is extremely low. An important element in the maximum time is that there is no imminent threat from an accident scenario, but only a system that is designed to respond to an accident being inoperable. Additionally, if the SNM package is in a Type B Shipping Container an additional significant level of protection is provided for the package until the package is placed in its final location to complete this action.

Required Action A.1.2 allows that an SNM DTO may be moved into the Zero Room. One day is allowed to perform this Required Action. See the bases for Required Action A.1.1 for bases for the one-day allowance. This Required Action is preceded by a NOTE that says it is an exception to LCO 3.0.1. To perform Required Action A.1.2, the SNM DTO will be moved into the (b) (7)(E) FIRE AREA even though the associated Fire Detection System and/or Fire Barrier(s) is INOPERABLE. This action has been analyzed and is allowed in this situation as a safe option. The Zero Room hazards were analyzed in the PrHA and the SNM in the Type B Shipping Container for this action.

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION A, ACTIONS and COMPLETION TIMES (continued)	Required Action A.1.3 allows that if the SNM is in the SCE Container, it may be placed in the Zero Room UNPACKING LOCATION and TRANSIENT COMBUSTIBLES in the area are removed. The UNPACKING LOCATION was selected as a safe location, based on access to approved lifting devices and the remoteness from hazards that could pose a threat to the package in the SCE Container until the INOPERABLE System(s) is restored to OPERABLE status. One day is allowed to perform this Required Action. See the bases for Required Action A.1.1 for bases for the one-day allowance. This Required Action is preceded by a NOTE that says it is an exception to LCO 3.0.1. To perform Required Action A.1.3, the SCE Container will be moved into the (b) (7)(E) FIRE AREA even though the associated Fire Detection System and/or Fire Barrier(s) is INOPERABLE. This action has been analyzed and is allowed in this situation as a safe option. The preapproved locations were identified during the hazard analysis as regions of inherently low hazard to the package, when no material handling activities were being performed on the package. Therefore, they have been selected as pre-approved locations away from identified hazards. In this Action, the package is already secured on the Insertion Cart; therefore, leaving the package on an approved cart provides an initial level of assurance for the package. Secondly, placing the package on the Assembly Table also limits the potential for insults based on the function of the table for assembly.

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION A, ACTIONS and COMPLETION TIMES (continued)	Required Action A.2 requires that the INOPERABLE System(s) be restored to OPERABLE status prior to SNM unpacking or handling operations within the (b) (7)(E) FIRE AREA except that required to perform Required Actions A.1.1 through A.1.3. No action time for completing the restore to OPERABLE status was assigned, based on the package being in a SECURED SHIPPING CONTAINER, or as in the case of Required Action A.1.3, being placed in the Zero Room, the package is in a safe configuration in any of these locations. Secondly, based on the assessment of the situation when the system was declared INOPERABLE, the decision by the SCE Test Director that the location was safe and appropriate to move the package provides a second near-term assessment of the AREA and the hazards in that location. Limiting unpacking or handling operations assures that the package remains in safe configuration and reduces the likelihood of an event near the package.
CONDITION B, ACTIONS and COMPLETION TIMES	Condition B is entered when the (b) (7)(E) Fire Detection System and/or the (b) (7)(E) Fire Barriers are INOPERABLE, **AND** the SNM is within the (b) (7)(E) FIRE AREA and within its SECURED SHIPPING CONTAINER. Required Action B.1 gives a choice of three options. Required Action B.1 is satisfied by the performance of either Required Actions B.1.1, B.1.2, or B.1.3. Required Action B.1.1 allows the SNM to be moved to the surface outside of the (b) (7)(E) AREA fence and TRANSIENT COMBUSTIBLES in the area are removed. Once the SNM is outside of the (b) (7)(E) AREA fence, this LCO no longer applies as the MODE APPLICABILITY would no longer be met. One day is allowed to perform this Required Action. Allowance of one day to move the package to the appropriate location (as defined by the action statements) is based on several factors: (1) the unlikelihood that a fire that would affect the SNM would occur during this one-day period; (2) should this occur at the end of a shift, the one-day allowance provides time to return a transport vehicle and its crew to the (b) (7)(E) AREA and remove the package in its SECURED SHIPPING CONTAINER or operations to make corrective actions deemed appropriate by the SCE Test Director before the move is completed; (3) a one-day allowance provides the SCE Test Director time to assess the situation in the underground and make a determination as to the best location for the package; during this time, the SNM is in its SECURED SHIPPING CONTAINER and afforded

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION B, ACTIONS and COMPLETION TIMES (continued)

the protection provided by that robust barrier; and (4) the unlikelihood that the (b) (7)(E) Fire Detection System and/or the (b) (7)(E) and (b) (7)(E) Fire Barriers would be declared inoperable during the period of time between the package entering the (b) (7)(E) FIRE AREA and the package being unpacked from its SECURED SHIPPING CONTAINER. An important element in the maximum time is that there is no imminent threat from an accident scenario, but only a system that is designed to respond to an accident being inoperable.

Required Action B.1.2 allows that an SNM DTO may be moved into the Zero Room. One day is allowed to perform this Required Action. See the bases for Required Action B.1.1 for bases for the one-day allowance.

Required Action B.1.3 allows that if the SNM is in the SCE Container, it may be placed in the Zero Room UNPACKING LOCATION and TRANSIENT COMBUSTIBLES in the area are removed until the INOPERABLE System(s) is restored to OPERABLE status. One day is allowed to perform this Required Action. See the bases for Required Action B.1.1 for bases for the one-day allowance.

Required Action B.2 requires that the INOPERABLE System(s) be restored to OPERABLE status prior to SNM unpacking or handling operations within the (b) (7)(E) FIRE AREA except that required to perform Required Actions B.1.1 through B.1.3. No action time for completing the restore to OPERABLE status was assigned, based on the package being in its SECURED SHIPPING CONTAINER. Secondly, based on the assessment of the situation when the system was declared INOPERABLE, the decision by the SCE Test Director that the location was safe and appropriate to move the package provides a second near-term assessment of the AREA and the hazards in that location. Limiting unpacking or handling operations assures that the package remains in safe configuration and reduces the likelihood of an event near the package.

CONDITION C, ACTIONS and COMPLETION TIMES

Condition C is entered when the (b) (7)(E) Fire Detection System and/or the (b) (7)(E) Fire Barrier are INOPERABLE, **AND** the SNM is within the (b) (7)(E) FIRE AREA but **not** within its SECURED SHIPPING CONTAINER.

Required Action C.1 gives a choice of three options. Required Action C.1 is satisfied by the performance of either Required Actions C.1.1, C.1.2, or C.1.3.

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION C, ACTIONS and COMPLETION TIMES (continued)

Required Action C.1.1 allows the SNM to be moved to an approved location in the Zero Room per Table 3-1. Table 3-1 lists approved locations within the Zero Room for the SNM. One day is allowed to perform this Required Action. Allowance of one day to move the package to the appropriate location (as defined by the action statements) is based on several factors: (1) should this occur at the end of a shift, the one-day allowance provides time for operations to make corrective actions deemed appropriate by the SCE Test Director before the move is completed; (2) a one-day allowance provides the SCE Test Director time to assess the situation in the underground and make a determination as to the best location for the package; and (3) the chance of a fire that would affect the SNM occurring during this one day period is extremely low. An important element in the maximum time is that there is no imminent threat from an accident scenario, but only a system that is designed to respond to an accident being inoperable.

The preapproved locations were identified during the hazard analysis as regions of inherently low hazard to the package, when no material handling activities were being performed on the package. Therefore, they have been selected as pre-approved locations away from identified hazards. The three approved locations in the Zero Room for the SCE Test Director to direct movement of the SNM are (1) on the Arming Table or Staging Stand, (2) inside the Vessel Confinement System with top closure plate in place and secured, and (3) secured on the Insertion Cart near the Arming Table or Staging Stand. The Arming Table or Staging Stand was determined to be a safe location based on its location in the Zero Room with limited fixed combustibles and its intended use for handling the SNM DTO or SCE. The Vessel Confinement System with the top closure plate in place was determined to be a safe location based on the functional design of the system to withstand the experiment execution PrHA assessment of fires in the Zero Room with the SNM in the Vessel Confinement System. The condition of the SNM DTO or SCE secured on the Insertion Cart and placed near the Arming Table or Staging Stand was determined to be a safe location based on (1) limiting handling of the SNM DTO or SCE, if it is already secured on the Insertion Cart, considering the analyzed condition of moving the SNM DTO or SCE on the Insertion Cart safely leads to the conclusion that leaving the package on an approved cart provides an initial level of assurance for the package; (2) the Insertion Cart was determined to be safe for moving the Experiment Package;

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION C, ACTIONS and COMPLETION TIMES (continued)

and (3) the staging location next to the Assembly Stand was determined to be a region of inherently low hazards (the limited space in that region inherently limits any significant transient combustible accumulation).

Required Action C.1.2 allows that if the SNM is in the SCE Container with the lid in place but not secured, the SNM may be left as is and TRANSIENT COMBUSTIBLES removed from the immediate area around the package. One day is allowed to perform this Required Action. See the bases for Required Action C.1.1 for bases for the one-day allowance.

Required Action C.1.3 allows that if the only SCE Container unpacking operation that has occurred is lid removal, the SCE Container lid may be replaced and the SNM may be left as is and TRANSIENT COMBUSTIBLES removed from the area. This is judged to be a safe condition based on the fact that the SCE remains secured to the SCE Container base and replacing the lid at this point does not introduce any unanalyzed hazards and the robust design of the SCE Container and the weight of the lid will provide a safe condition while the INOPERABLE system(s) are being restored. One day is allowed to perform this Required Action. See the bases for Required Action C.1.1 for bases for the one-day allowance.

Required Action C.2 requires that the INOPERABLE System(s) be restored to OPERABLE status prior to SNM unpacking or handling operations within the (b) (7)(E) FIRE AREA except that required to perform Required Actions C.1.1 through C.1.3. No action time for completing the restore to OPERABLE status was assigned, based on the package being placed in a safe location, based on the SCE Test Director's determination as to the safest location for the package. Additional measures were identified (e.g., removing TRANSIENT COMBUSTIBLES in the immediate area where deemed appropriate). Secondly, based on the assessment of the situation when the system was declared INOPERABLE, the decision by the SCE Test Director that the location was safe and appropriate to move the package provides a second near-term assessment of the AREA and the hazards in that location. Limiting unpacking or handling operations assures that the package remains in safe configuration and reduces the likelihood of an event near the package.

(continued)

A3.1.3 (b) (7)(E) Fire Detection System/ (b) (7)(E) Fire Barriers (continued)

BASES

CONDITION C, ACTIONS and COMPLETION TIMES (continued)	Handling operations include entombment activities associated with the handling of the VCS. These activities include grouting of the VCS for entombment, which involves routing the grout line through the (b) (7)(E) Fire Barrier fire door threshold for a short time duration on the order of less than a day. During entombment activities, the SNM is in an approved location inside the VCS with the top closure plate in place and secured.
SURVEILLANCE REQUIREMENTS	
SR 4.1.3.1	Semi-Annually, a functional test of the (b) (7)(E) Fire Detection System shall be performed. The Surveillance Frequency of this SR is based on the requirements of NFPA 72, *National Fire Alarm and Signaling Code* (NFPA 72). The test must verify that the Fire Detection System can detect a fire and send the appropriate signals to initiate closure of the (b) (7)(E) Fire Barrier fire doors, supply and exhaust ventilation fire/smoke dampers, and barrier wall dampers. Failure to meet or perform the requirements of this SR requires declaring the system INOPERABLE and entry into Condition A, B, or C as appropriate.
SR 4.1.3.2	Annually, a functional test of the (b) (7)(E) Fire Barrier fire doors, supply and exhaust ventilation fire/smoke dampers, and barrier wall dampers shall be performed. This test must verify that the (b) (7)(E) Fire Barrier fire doors, supply and exhaust ventilation fire/smoke dampers, and barrier wall dampers fully close upon receiving the proper signals from the (b) (7)(E) Fire Detection System. The Surveillance Frequency of this SR is based on the requirements of NFPA 80, *Standard for Fire Doors and Other Opening Protectives* (NFPA 80). Failure to meet or perform the requirements of this SR requires declaring the system INOPERABLE and entry into Condition A, B, or C as appropriate.
REFERENCES	MSTS 2018. *Fire Hazard Analysis for the U1a Complex,* FHA-U1a.001, Rev. 3 (or successor document), Mission Support and Test Services, LLC, Las Vegas, NV, July 2018. NFPA 72. *National Fire Alarm Code*. NFPA 72, National Fire Protection Association, Quincy, MA. NFPA 80. *Standard for Fire Doors and Other Opening Protectives*. NFPA 80, National Fire Protection Association, Quincy, MA. NSTec 2012. *Request for Exemption from DOE O 420.1B Fire Protection Design Requirements for the Nevada National Security Site U1a Complex*. Revision 2, National Security Technologies, LLC, Las Vegas, NV, August 8, 2012.

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A3.1.4 Secured Zero Room Configuration

BASES

BACKGROUND SUMMARY

The Secured Zero Room Configuration is a Specific Administrative Control that is credited in the hazard analysis to reduce the likelihood of a fire that could result in a release of radioactive material or an HEVR. The safety function of this SAC is to ensure that the Zero Room is placed in a secured configuration at the end of each operational day. A secured configuration is achieved when a sweep of the Zero Room is completed to confirm that TRANSIENT COMBUSTIBLES not needed to support the experiment brought into the room are removed from the room, and the Zero Room is locked.

This administrative control was selected as a SAC because the hazard analysis identified this control as necessary to prevent or mitigate an accident scenario and the SAC has a safety function that would be safety-significant if the function were provided by an SSC.

Failure of this SAC could occur through human error (e.g., failure to recognize and eliminate the TRANSIENT COMBUSTIBLES prior to leaving the Zero Room).

TRANSIENT COMBUSTIBLES are defined as combustible/flammable items that are not part of the permanent facility structure, installed facility components, accessories, or equipment. TRANSIENT COMBUSTIBLES may include, but may not be limited to, the following: combustible parts of tools and equipment (e.g., cable insulation), general trash, paper or plastic products, packing/packaging materials and are removed when workers exit the Zero Room.

APPLICATION TO SAFETY ANALYSIS

The PrHA [process hazards analysis], as part of the U1a Complex DSA, evaluated fire event scenarios related to the presence of TRANSIENT COMBUSTIBLES that potentially results in consequences to facility workers and required SS controls to mitigate the consequences of these postulated events. The Secured Zero Room Configuration reduces the presence of TRANSIENT COMBUSTIBLES in the Zero Room at the end of the operational day. The removal of the TRANSIENT COMBUSTIBLES reduces the combustible loading of the Zero Room, which helps ensure that a fire could not cause a release of radioactive material or detonate HE in the room.

This control compensates for the lack of a FIREWATCH control. A FIREWATCH control reduces the risk of fire events when the Zero Room is occupied and ongoing operations increase the risk of initiating a fire.

(continued)

A3.1.4 Secured Zero Room Configuration (continued)

BASES	
LCO	Secured Zero Room Configuration shall be maintained at the end of the operational day.
MODE APPLICABILITY	The MODE to which this LCO is applicable is: "EXPERIMENT ACTIVE OPERATIONS." This is appropriate because radioactive material and explosives are allowed into the U1a Complex in this MODE, but this LCO is not required to be in effect until SNM is actually within the AREA of applicability.
AREA APPLICABILITY	The AREA of applicability is in the Zero Room.
CONDITION A, ACTIONS and COMPLETION TIMES	Condition A is entered when the Zero Room must be secured at the end of the operational day. The Zero Room is found to be NOT Secured. Under this condition, Required Actions A.1 and A.2 are performed. Action A.1 requires that all operations involving SNM or an SCE in the Zero Room cease IMMEDIATELY. Since this LCO is initiated at the end of the operational day, operations involving SNM or an SCE will already be halted or in the process of being concluded. The completion time of IMMEDIATELY is considered reasonably achievable. Action A.2 requires that the Surveillance Requirement SR 4.1.4.1 be executed prior to establishing the securing the Zero Room Configuration. Since the TRANSIENT COMBUSTIBLES to be removed are no greater than that brought into the Zero Room at the start of the operational day, the required time for removal is reasonably short and manageable.
SURVEILLANCE REQUIREMENTS	
SR 4.1.4.1	Prior to securing the Zero Room, a sweep of the Zero Room shall be performed to ensure that TRANSIENT COMBUSTIBLES not needed to support the experiment are removed from the Zero Room at the end of the operational day and the Zero Room is locked when an SCE or SNM DTO is present in the Zero Room. The Surveillance Frequency of this SR is based on the frequency of the operational day. Failure to meet or perform the requirements of this SR requires declaring the Zero Room is not secured.
REFERENCES	MSTS 2018. *Fire Hazard Analysis for the U1a Complex*. FHA-U1a.001, Rev. 3 (or successor document), Mission Support and Test Services, LLC, Las Vegas, NV, July 2018.

A3.1.5 Severe Weather Restriction

BASES

BACKGROUND SUMMARY

The Severe Weather Restriction is a Specific Administrative Control that prohibits handling an SCE in a shipping container during a High Wind Warning and lightning strikes at the (b) (7)(E) AREA based on ARL/SORD information. Wind conditions and lightning strikes are routinely reported to NNSS and U1a personnel as follows:

- A Wind Advisory is issued when winds of at least 30 mph and/or gusts to at least 40 mph are imminent or occurring.
- A High Wind Watch is issued when there is the potential for winds of at least 40 mph and/or gusts to at least 58 mph.
- A High Wind Warning is issued when winds of at least 40 mph and/or gusts to at least 58 mph are imminent or occurring.
- A lightning strike occurrence within a 20-mile radius of the U1a Complex, and SCE operations are in progress, personnel will shut down SCE operations, and ensure the SCE) is placed in a safe and stable configuration.

This SAC applies during a High Wind Warning or during the occurrence of lightning strikes.

APPLICATION TO SAFETY ANALYSIS

This SAC is credited in the HAZARD analysis with preventing the SCE inside its container from being impacted by a wind driven missile or direct lightning strike. Although an SCE container is designed to protect the SCE from mechanical impacts that could occur during mishandling accidents, a design basis wind-driven missile or direct lightning strike represents a more severe impact event that could exceed the structural capacity of the container. This prohibition also prevents mishandling accidents that might be caused by high wind conditions or the occurrence of lightning strikes. Although the SCE container is designed for mechanical impacts that may be caused by operator error, such as being dropped while being loaded onto the vehicle, it is prudent to minimize the likelihood of challenging the structural capability of the container.

(continued)

A3.1.5 Severe Weather Restriction (continued)

LCO	SCE Handling Operations at the (b) (7)(E) AREA shall not be performed when a high wind condition or the occurrence of lightning strikes is in effect at the U1a Complex.
MODE APPLICABILITY	The MODE to which this LCO is applicable is: "EXPERIMENT ACTIVE OPERATIONS"
AREA APPLICABILITY	The AREA of applicability is the (b) (7)(E) AREA.
CONDITION A, ACTIONS and COMPLETION TIMES	CONDITION A is entered when a High Wind Warning is issued at the U1a Complex while an SCE in the shipping container is at the (b) (7) (E) AREA. Under this CONDITION, either ACTION A.1 or ACTION A.2 is entered. ACTION A.1 requires returning the SCE (in the shipping container) into the secured transport vehicle, or leaving the SCE in the secured transport vehicle if it has not already been unloaded. The transport vehicle doors should be closed to complete the loading operation. This ACTION should be performed if it can be completed safely. The COMPLETION TIME for this ACTION is IMMEDIATELY upon declaring that the LCO is not being met. This ACTION reduces the likelihood that the SCE will be mishandled or subjected to a mechanical impact from wind-driven debris. ACTION A.2 requires transferring the SCE in the shipping container down the (b) (7)(E) to a location in the Zero Room as directed. This ACTION should be performed rather than ACTION A.1 if the unloading operation has progressed to a point where the SCE cannot be safely returned to the secured transport vehicle and high wind conditions have arisen. This ACTION protects the SCE in the shipping container from wind-driven debris and prevents a mishandling accident.

(continued)

A3.1.5 Severe Weather Restriction (continued)

CONDITION B, ACTIONS and COMPLETION TIMES	CONDITION B is entered when lightning strikes are occurring within a 20-mile radius at the U1a Complex, while an SCE in the shipping container is at the (b) (7)(E) AREA. Under this CONDITION, either ACTION B.1 or ACTION B.2 is entered. ACTION B.1 requires returning the SCE (in the shipping container) into the secured transport vehicle, or leaving the SCE in the secured transport vehicle if it has not already been unloaded. The transport vehicle doors should be closed to complete the loading operation. This ACTION should be performed if it can be completed safely. The COMPLETION TIME for this ACTION is IMMEDIATELY upon declaring that the LCO is not being met. This ACTION reduces the likelihood that the SCE will be subjected to a direct lightning strike. ACTION B.2 requires transferring the SCE in the shipping container down the (b) (7)(E) to a location in the Zero Room as directed. This ACTION should be performed rather than ACTION B.1 if the unloading operation has progressed to a point where the SCE cannot be safely returned onto the secured transport vehicle and lightning conditions have occurred. This ACTION protects the SCE in the shipping container from direct lightning strikes.
SURVEILLANCE REQUIREMENTS	
SR 4.1.5.1	Verify that a High Wind Warning is not in effect at the U1a Complex. The Surveillance Frequency is performed 30 minutes prior to SCE Handling Operations in the (b) (7)(E) AREA and during SCE Handling Operations until the shipping container with SCE is in a location in the Zero Room as directed.
SR 4.1.5.2	Verify that no lightning strike occurrences have been detected at the U1a Complex within a 20-mile radius. The Surveillance Frequency is performed 30 minutes prior to SCE Handling Operations in the (b) (7)(E) AREA and during SCE Handling Operations until the shipping container with SCE is in a location in the Zero Room as directed.