SANDIA REPORT

SAND2003-4491
Unlimited Release
Printed February 2004

Technical Safety Requirements for the Auxiliary Hot Cell Facility

Point of Contact: Roland F. Seylar
Department 6882, Hot Cells and Gamma Facilities

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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TECHNICAL SAFETY REQUIREMENTS FOR THE AUXILIARY HOT CELL FACILITY (AHCF)

Sandia National Laboratories, Albuquerque
P.O. Box 5800
Albuquerque, New Mexico 87185

February 2004

Approved By: _____
Vice President; Energy, Information, and Infrastructure Technology

ABSTRACT

These Technical Safety Requirements (TSRs) identify the operational conditions, boundaries, and administrative controls for the safe operation of the Auxiliary Hot Cell Facility (AHCF) at Sandia National Laboratories, in compliance with 10 CFR 830, "Nuclear Safety Management." The bases for the TSRs are established in the AHCF Documented Safety Analysis (DSA), which was issued in compliance with 10 CFR 830, Subpart B, "Safety Basis Requirements." The AHCF Limiting Conditions of Operation (LCOs) apply only to the ventilation system, the high efficiency particulate air (HEPA) filters, and the inventory. Surveillance Requirements (SRs) apply to the ventilation system, HEPA filters, and associated monitoring equipment; to certain passive design features; and to the inventory. No Safety Limits are necessary, because the AHCF is a Hazard Category 3 nuclear facility.

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AUXILIARY HOT CELL FACILITY

INTRODUCTION

This document provides the Technical Safety Requirements (TSRs) for the Auxiliary Hot Cell Facility (AHCF) at Sandia National Laboratories (SNL). The bases for the TSRs are established in the AHCF Documented Safety Analysis (DSA), which was issued in compliance with 10 CFR 830, "Nuclear Safety Management," Subpart B, "Safety Basis Requirements." The TSRs compile the requirements that define the conditions, the safe boundaries, and the administrative controls (ACs) necessary to ensure the safe operation of the AHCF and to reduce the potential risk to the public and facility workers from uncontrolled releases of RADIOACTIVE or other HAZARDOUS MATERIAL. These requirements constitute an agreement between the U.S. Department of Energy (DOE) and SNL management regarding the safe operation of the AHCF.

This document conforms to the outline provided in the DOE guidance document, "Implementation Guide for Use in Developing Technical Safety Requirements" (DOE 2003). Section 1, "Use and Application," contains basic information and instructions for using and applying the TSRs. Section 2, "Safety Limits," does not apply to the AHCF, because the AHCF is a Hazard Category 3 nuclear facility. Section 3/4, "Operational Limits and Surveillance Requirements," presents the applicable Limiting Conditions for Operation (LCOs) and discusses the MODES, Action Statements, and Surveillance Requirements associated with each limit. Section 5, "Administrative Controls," sets forth the programmatic and other commitments that are necessary to 1) ensure the validity of the assumptions in the TSR Bases; 2) ensure worker safety and defense in depth; and 3) effectively manage operational safety. Appendix A, "Bases for the Technical Safety Requirements," provides the rationale underlying the various TSR controls.

The AHCF is divided into two Zones. Zone 1 encompasses the AHCF ventilation system, including the hot cell; fume hood; high efficiency particulate air (HEPA) filter bank; exhaust fan; and ductwork to the hot cell, fume hood, and temporary room if the latter is in place. The overall Building 6597 ventilation system services Zone 2, which encompasses everything outside Zone 1. MODES apply individually to the hot cell, fume hood, and temporary room, which are the only AHCF structures attached to the Zone-1 ventilation system. The Zone-1 ventilation system controls the release of contaminants to the general environment.

Under most circumstances, the AHCF will be either in OPERATION MODE or in SHUTDOWN MODE. Any activity that presents an airborne contamination hazard must take place in OPERATION MODE. Activities that present no airborne contamination hazard may take place regardless of the status of the ventilation system. SHUTDOWN MODE might be used, for example, for non-work hours, holiday periods, or planned maintenance. RADIOACTIVE MATERIALS will be removed or placed in a SAFE CONFIGURATION in OPERATION

MODE or WARM STANDBY MODE before entry into SHUTDOWN MODE. No special restart procedures are required after entering SHUTDOWN MODE at the AHCF.

WARM STANDBY MODE provides an orderly procedure for moving from OPERATION MODE to SHUTDOWN MODE in the face of an unforeseen event. Such unforeseen events might include equipment malfunction or unplanned power outage, for example, while the AHCF is in OPERATION MODE.

MODES do not apply to other AHCF structures, e.g., silos, or to activities that present no airborne contamination hazard.

SECTION 1

USE AND APPLICATION

1.0 DEFINITIONS AND ACRONYMS

The defined terms of this section appear in capitalized type and are applicable throughout these TSRs and bases.

Definitions

ACTION	That part of a TSR that prescribes required actions to be taken under designated conditions within specified completion times.
CALIBRATE	To quantitatively VERIFY or adjust a CHANNEL such that its output corresponds with acceptable accuracy to known values of the parameter that the CHANNEL measures.
CHANNEL	The combination of sensor, line, amplifier, and output devices that are connected for the purpose of measuring the value of a parameter.
CHANNEL FUNCTIONAL TEST	The injection of a simulated or actual signal into the CHANNEL as close to the sensor as practicable, to VERIFY CHANNEL OPERABILITY, including required alarms, interlocks, actuation/trip functions, and CHANNEL failure trips. The CHANNEL FUNCTIONAL TEST may be performed by any series of sequential, overlapping, or total CHANNEL steps that test the entire CHANNEL.
HAZARDOUS MATERIAL	Any solid, liquid, or gaseous material that is toxic, explosive, flammable, corrosive, or otherwise physically or biologically threatening to health.
IMMEDIATELY	A completion time when a condition cannot be permitted to continue and the required ACTION must be initiated without delay and continued until the required ACTION is completed.
IN-SERVICE	A system, subsystem, component, or device is IN-SERVICE when it is in place and performing its specified function.
LCO	A definition of the limits that represent the lowest functional capability or performance level of safety SSCs required to perform an activity safely.
MODE	Any combination of facility condition, activities, and material configuration specified in Table 1.

OPERABLE/ OPERABILITY	A system, subsystem, component, or device is OPERABLE or has OPERABILITY when it is capable of performing its specified function.
RADIOACTIVE MATERIAL	Any material that undergoes radioactive decay.
SAFE CONFIGURATION	A chemical or physical form of material or the arrangement of material or equipment that minimizes risk.
SHALL	Denotes a requirement.
SR	A short description of a required surveillance and its frequency of performance.
VERIFY	To confirm and substantiate that an activity or condition has been implemented in conformance with the specified requirements. Manipulation of equipment or instrumentation to conform with the specified requirement is not permitted. Methods other than direct observation may be used.

Acronyms

AC	Administrative Control
AHCF	Auxiliary Hot Cell Facility
cfm	cubic feet per minute
CSA	Criticality safety assessment
DOE	U.S. Department of Energy
DOE/SSO	DOE/Sandia Site Office
DSA	Documented Safety Analysis
ES&H	Environment, Safety & Health
fpm	feet per minute
HEPA	High Efficiency Particulate Air
LCO	Limiting Condition for Operation
MIP	Maintenance Implementation Plan
NFSC	Nuclear Facilities Safety Committee
QAPP	Quality Assurance Program Plan
RCSC	Radiological and Criticality Safety Committee
RPPM	Radiological Protection Procedures Manual
RREP	Research Reactor and Experimental Programs
SIRAS	Sandia Independent Review and Appraisal System
SNL	Sandia National Laboratories
SR	Surveillance Requirement
TA-V	Technical Area V
TSR	Technical Safety Requirement

USQ	Unreviewed Safety Question
WC	Water column

1.1 MODES

AHCF MODES are summarized in Table 1.

1.2 FREQUENCIES

This section defines the proper use and application of frequency requirements. Each surveillance requirement (SR) has a specified frequency that must be met in order to meet the associated LCO. An understanding of the correct application of the specified frequency is necessary for compliance with the SR.

The frequency notations, as used in the surveillances and elsewhere in this document, are defined as follows.

Notation	**Minimum Frequency**
Daily	At least once every 24 hours
Weekly	At least once every 7 days
Quarterly	At least once every 90 days
Annually	At least once every 365 days

Generic surveillance requirement SR 4.0.2 (see Section 4.0) applies to these definitions.

Table 1. AHCF Mode Definitions

Modes apply only to areas serviced by the Zone-1 Ventilation System. Modes apply individually to the hot cell, fume hood, and temporary room. Modes do not apply to other AHCF structures, e.g., silos. The ventilation system is not required for activities that present no airborne contamination hazard. (Zone 1 and Zone 2 are defined in the Introduction.)

	OPERATION	WARM STANDBY	SHUTDOWN
WORK STATUS	Normal activities either can be or are being performed, including movement, treatment, and repackaging of waste and materials.	Waste- and material-processing activities are not permitted in the affected area (i.e., hot cell, fume hood, or temporary room). Movement of HAZARDOUS MATERIALS and RADIOACTIVE MATERIALS that present an airborne contamination hazard is not permitted, except for changing to a SAFE CONFIGURATION.	No movement, treatment, or repackaging of RADIOACTIVE or HAZARDOUS MATERIALS is permitted in the affected area (i.e., hot cell, fume hood, or temporary room).
MATERIAL STATUS	Location and configuration of RADIOACTIVE and HAZARDOUS MATERIALS are not restricted.	Location and configuration of RADIOACTIVE and HAZARDOUS MATERIALS are not restricted.	Location of RADIOACTIVE and HAZARDOUS MATERIALS is not restricted. RADIOACTIVE and HAZARDOUS MATERIALS are in a SAFE CONFIGURATION.
EQUIPMENT/ OPERATOR STATUS	Essential ventilation system equipment is IN SERVICE. Required personnel are available.	Essential ventilation system equipment is INOPERABLE or required personnel are unavailable.	Status of essential ventilation system equipment is not restricted.

SECTION 2

SAFETY LIMITS

2.0 SAFETY LIMITS

This section is not applicable to Auxiliary Hot Cell Facility operations, because the AHCF is a Hazard Category 3 nuclear facility that does not have significant off-site impacts.

SECTION 3/4

OPERATIONAL LIMITS AND SURVEILLANCE REQUIREMENTS

MODES apply individually to the hot cell, fume hood, and temporary room, which are the only AHCF structures attached to the Zone-1 ventilation system. MODES do not apply to other AHCF structures, e.g., silos, or to activities that present no airborne contamination hazard. Activities that present no airborne contamination hazard may take place regardless of the status of the ventilation system.

Under most circumstances, the AHCF will be either in OPERATION MODE or in SHUTDOWN MODE. SHUTDOWN MODE might be used, for example, for non-work hours, holiday periods, or planned maintenance. RADIOACTIVE MATERIALS will be removed or placed in a SAFE CONFIGURATION in OPERATION MODE or WARM STANDBY MODE before entry into SHUTDOWN MODE. No special restart procedures are required after entering SHUTDOWN MODE at the AHCF.

Zone 1 encompasses the AHCF ventilation system, including the hot cell; fume hood; HEPA filter bank; exhaust fan; and ductwork to the hot cell, fume hood, and temporary room if the latter is in place. The overall Building 6597 ventilation system services Zone 2, which encompasses everything outside Zone 1.

3.0 GENERIC LIMITING CONDITIONS FOR OPERATION

3.0.1 LCOs SHALL be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2.

3.0.2 Upon discovery of a failure to meet an LCO, the associated ACTIONS SHALL be met. If the LCO is restored before the specified completion time(s) expires, completion of the ACTION is not required, unless otherwise stated.

3.0.3 When an LCO is not met, and the associated ACTIONS are not met, or when an associated ACTION is not provided, the facility SHALL be placed in a MODE or another specified condition in which the LCO is not applicable. If the LCO is applicable in all MODES, the facility shall be placed in the safest MODE.

3.0.4 When an LCO is not met, a MODE or other specified condition in the 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 applicability statement for an unlimited period of time. LCO 3.0.4 SHALL not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS.

Exceptions to LCO 3.0.4 are stated in the individual LCOs. When an individual LCO states that LCO 3.0.4 does not apply, then it allows entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to

be entered permit operation in the MODE or other specified condition for only a limited time.

3.0.5 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 is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

3.0.6 When a support system is declared inoperable, the supported system is also required to be declared inoperable. However, only the support system's ACTIONS are required to be entered. This is a clarification of the definition of OPERABILITY.

4.0 GENERIC SURVEILLANCE REQUIREMENTS

4.0.1 SRs SHALL be met during the MODES or other specified conditions in the Applicability for individual LCOs unless otherwise stated in the SR. Failure to meet a surveillance requirement (whether such failure is experienced during the performance of the surveillance or between performances of the surveillance) SHALL constitute failure to meet the LCO statement. Failure to perform a surveillance within the specified frequency SHALL constitute failure to meet the LCO, except as provided in SR 4.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

4.0.2 The specified frequency for each SR is met if the surveillance is performed within 1.25 times the interval specified in the frequency, as measured from the previous performance or as measured from the time a specified condition of the frequency is met.

4.0.3 If it is discovered that a surveillance was not performed within its specified frequency, compliance with the requirement to declare the LCO statement not met may be delayed from the time of discovery up to 24 hours or up to the limit of the specified frequency, whichever is less. This delay period is permitted to allow performance of the surveillance.

If the surveillance is not performed within the delay period, the LCO statement SHALL IMMEDIATELY be declared not met, and the applicable ACTIONS SHALL be entered. The completion times of the ACTIONS begin IMMEDIATELY on expiration of the delay period. When the surveillance is performed within the delay period and the surveillance is not met, the LCO SHALL IMMEDIATELY be declared not met, and the applicable ACTIONS SHALL be entered. The completion times of the ACTIONS begin IMMEDIATELY on the failure to meet the surveillance.

4.04 Entry into a MODE or other specified condition in the Applicability of an LCO SHALL not be made unless the LCO's surveillances have been met within their specified frequency. This provision SHALL not prevent passage through or to MODES or other specified conditions in compliance with ACTIONS.

3/4.1 LIMITING CONTROL SETTINGS

This section is not applicable to Auxiliary Hot Cell Facility operations, because there are no safety limits for Hazard Category 3 nuclear facilities.

3/4.2 LIMITING CONDITIONS FOR OPERATION

3/4.2.1 Ventilation System (IN-SERVICE) for Hot Cell

LCO: The AHCF ventilation system for the hot cell SHALL consist of the following equipment/conditions:

The exhaust fan and high efficiency particulate air (HEPA) filter bank SHALL be OPERABLE and IN-SERVICE;

AND

The Zone-1 differential pressure measurement SHALL be between 0.25 and 1.0 WC when the hot-cell roof plugs are in place;

OR

Hot-cell airflow SHALL be between 10 and 1500 cubic feet per minute (cfm) with the hot-cell roof plugs removed.

APPLICABILITY: OPERATION MODE

ACTIONS:

Condition	Required Action	Completion Time
A. Exhaust fan or HEPA filter bank inoperable	A.1 Place the hot cell in WARM STANDBY MODE **AND** A.2 Restore the exhaust fan and HEPA filter bank to operable **OR** A.3 Place hot cell in SHUTDOWN MODE	IMMEDIATELY 96 hours 96 hours
B. Zone-1 differential pressure measurement less than 0.25 or greater than 1.0 WC with hot cell roof plugs in place.	B.1 Place the hot cell in WARM STANDBY MODE **AND** B.2 Restore correct Zone-1 differential pressure **OR** B.3 Place hot cell in SHUTDOWN MODE	IMMEDIATELY 96 hours 96 hours
C. Hot-cell airflow less than 10 or greater than 1500 cfm with roof plugs removed	C.1 Place the hot cell in WARM STANDBY MODE **AND** C.2 Restore airflow from Zone 2 to Zone 1 **OR** C.3 Place hot cell in SHUTDOWN MODE	IMMEDIATELY 96 hours 96 hours

SURVEILLANCE REQUIREMENTS:

SR#	Surveillance	Frequency
4.2.1.1	VERIFY Zone-1 differential pressure measurement between 0.25 and 1.0 WC while hot-cell roof plugs are in place	Daily
4.2.1.2	VERIFY hot-cell airflow between 10 and 1500 cfm while the hot-cell roof plugs removed	Daily when hot-cell operation requires plug removal
4.2.1.3	Perform a CHANNEL FUNCTIONAL TEST on hot-cell airflow measurement CHANNEL	Quarterly
4.2.1.4	Perform a CHANNEL FUNC-TIONAL TEST on differential pressure measurement CHANNELS	Quarterly
4.2.1.5	VERIFY exhaust airflow alarm OPERABILITY	Quarterly
4.2.1.6	CALIBRATE hot-cell airflow measurement CHANNEL	Annually
4.2.1.7	CALIBRATE the Zone 1 vs. Zone 2 differential pressure measurement CHANNELS	Annually
4.2.1.8	Perform HEPA filter bank in-place leak test.	Annually **OR** After any structural maintenance in the filter housing **OR** Upon installation of new HEPA filters
4.2.1.9	Perform HEPA filter bank penetration test.	Annually

3/4.2.2 Ventilation System (IN-SERVICE) for Fume Hood or Temporary Room

LCO: The AHCF ventilation system for the fume hood and temporary room SHALL consist of the following equipment/conditions:

The exhaust fan and the HEPA filter bank SHALL be OPERABLE and IN-SERVICE;

AND

Either the fume hood or the temporary room, but not both, may be IN-SERVICE at any given time (i.e., if the fume hood is IN-SERVICE, the temporary room SHALL be in SHUTDOWN MODE, and if the temporary room is IN-SERVICE, the fume hood SHALL be in SHUTDOWN MODE);

AND

Face velocity at the fume hood entrance SHALL be >90 fpm (feet per minute);

OR

Airflow through the temporary room SHALL be between 10 cfm and 1500 cfm and SHALL not exceed the temporary-room manufacturer's specifications.

APPLICABILITY: OPERATION MODE

ACTIONS:

Condition	Required Action	Completion Time
A. Exhaust fan or HEPA filter bank inoperable	A.1 Place the fume hood and temporary room in WARM STANDBY MODE **AND** A.2 Restore the exhaust fan and HEPA filter bank to operable **OR** A.3 Place the fume hood and temporary room in SHUTDOWN MODE	IMMEDIATELY 96 hours 96 hours
B. Face velocity ≤90 fpm at the entrance of the fume hood when IN-SERVICE	B.1 Place the fume hood in WARM STANDBY MODE **AND** B.2 Restore face velocity **OR** B.3 Place fume hood in SHUTDOWN MODE	IMMEDIATELY 96 hours 96 hours
C. Airflow through the temporary room less than 10 cfm or greater than 1500 cfm or in excess of the temporary-room manufacturer's specifications when IN-SERVICE	C.1 Place the temporary room in WARM STANDBY MODE **AND** C.2 Restore airflow direction in the temporary room between 10 cfm and 1500 cfm without exceeding the temporary-room manufacturer's specifications **OR** C.3 Place temporary room in SHUTDOWN MODE	IMMEDIATELY 96 hours 96 hours

SURVEILLANCE REQUIREMENTS:

SR#	Surveillance	Frequency
4.2.2.1	VERIFY fume hood face velocity is > 90 fpm	Daily
4.2.2.2	VERIFY airflow through the temporary room between 10 cfm and 1500 cfm and in accordance with temporary-room manufacturer's specifications	Daily when temporary room is in use
4.2.2.3	Perform a CHANNEL FUNCTIONAL TEST on fume hood face-velocity measurement CHANNEL	Quarterly
4.2.2.4	Perform a CHANNEL FUNCTIONAL TEST on temporary-room airflow measurement CHANNEL	Quarterly
4.2.2.5	VERIFY exhaust airflow alarm OPERABILITY	Quarterly
4.2.2.6	CALIBRATE fume hood face-velocity measurement CHANNEL	Annually
4.2.2.7	Perform HEPA filter bank in-place leak test.	Annually **OR** After any structural maintenance in the filter housing **OR** Upon installation of new HEPA filters
4.2.2.8	Perform HEPA filter bank penetration test.	Annually

3/4.2.3 RADIOACTIVE MATERIAL Inventory Limit

LCO: The total RADIOACTIVE MATERIAL inventory in the AHCF SHALL remain below the Hazard Category 2 threshold.

APPLICABILITY: OPERATION, WARM STANDBY, and SHUTDOWN MODES

ACTIONS:

Condition	Required Action	Completion Time
A. The RADIOACTIVE MATERIAL inventory limit for the AHCF is exceeded.	A.1. Enter WARM STANDBY if in OPERATION, and stop all RADIOACTIVE MATERIAL handling sampling in the AHCF, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION. **AND** A.2. Develop and implement an approved plan to reduce the AHCF inventory below the Hazard Category 2 threshold.	IMMEDIATELY Before resuming OPERATION

SURVEILLANCE REQUIREMENTS

SR#	Surveillance	Frequency
4.2.3.1	Verify that the Hazard Category 2 threshold will not be exceeded by receiving a new package.	Before receiving a new package

SECTION 5

ADMINISTRATIVE CONTROLS

5.0 PURPOSE

The purpose of the ACs is to delineate the provisions relating to organization and management, procedures, record keeping, review and audit, reporting, and safety-control programs necessary to ensure safe operation of the AHCF so that it complies with the TSRs.

5.1 TECHNICAL SAFETY REQUIREMENTS

5.1.1 General Requirements

The TSRs SHALL be administratively controlled. Proposed changes to the TSRs SHALL be prepared with a submittal package that includes a description of, and justification for, the change together with any supporting analyses. Proposed changes SHALL be approved by the DOE prior to implementation.

5.1.2 Compliance

The AHCF manager is responsible for ensuring that the requirements of the TSRs for the AHCF are met, and SHALL demonstrate compliance by

- Establishing, implementing, and maintaining the required LCOs and ACs, and
- Maintaining required design features.

5.1.3 TSR Violations

Violations of the TSRs occur as the result of

- Entry into an LCO Condition and failure to comply with the applicable ACTION Statements within the required completion time;
- Missing a surveillance requirement frequency (taking into account any extension per SR 4.0.2); or
- Discovery of non-compliance with an AC.

Failure to comply with an AC statement is a TSR violation only when an AC requirement is directly violated (e.g., not meeting a minimum staffing requirement) or the intent of a cited program is not fulfilled (e.g., a significant program deficiency). As long as a cited program is functional and the intent of the program is being fulfilled, violation of specific program details may not constitute a TSR violation.

5.1.4 Response to a TSR Violation

If a violation occurs, the following ACTIONS SHALL be taken:

- Notify the DOE, and
- Prepare an occurrence report.

5.1.5 Conditions Outside TSRs

Actions may be taken that depart from a requirement in the TSR provided that

- An emergency exists and is so declared;
- These actions are needed IMMEDIATELY to protect the public health and safety;
- No ACTION consistent with the TSRs can provide adequate or equivalent protection;
- Action is approved by a qualified operator or on-duty supervisor;
- Verbal notification to DOE Sandia Site Office (DOE/SSO) occurs within 2 hours; and
- A written report is made within 24 hours.

Actions in response to immediate hazards take precedence over actions in response to potential hazards.

5.2 MANAGEMENT ORGANIZATION

The general management structure for AHCF operations is addressed in Section 8.12 of the DSA. Operation of the AHCF is the responsibility of the SNL division in charge of nuclear facilities. Operational authority for the AHCF is delegated by the division vice-president to the center director, deputy director, and department manager. Line management is responsible for the health and safety of ACHF personnel.

5.3 PROCEDURES

Procedures/instructions SHALL be established, implemented, and maintained for activities in support of the TSRs. AHCF Operating Procedures SHALL govern the basic aspects of operation for startup, operation, shutdown and material handling. This includes maintenance procedures for safety-related equipment, abnormal or alarm procedures, emergency or accident procedures, surveillance procedures, and procedures to execute the basics of the TSR programs.

The access-control provisions of the *Radiological Protection Procedures Manual* (RPPM; SNL latest issue f) SHALL be incorporated into AHCF procedures and SHALL apply to all operations and maintenance activities at the AHCF.

A campaign plan and package-specific work instructions for safe handling and expected short-term storage at the AHCF SHALL address the following elements:

- existing characterization information, including known package contents, nuclear material accountability, and safeguards and security requirements;
- total AHCF inventory after the package is introduced;

- fissile-material inventory limitations;
- potential for specific hazards, including
  - criticality potential,
  - radiological concerns,
  - liquids,
  - combustible or flammable materials (including the potential for flammable gas generated by hydrolysis),
  - reactive or pyrophoric materials,
  - toxic materials, or
  - pressurized containers;
- handling considerations;
- storage requirements at the AHCF; and
- contingency planning.

Some or all of these elements may be addressed in a single campaign plan that encompasses the handling requirements for a number of related packages or in other technical work documents.

All material SHALL be contained in strong/tight packaging, as defined in the Environment, Safety and Health (ES&H) Manual (SNL latest issue c), or the equivalent for arrival, departure, and short-term storage at the AHCF.

5.4 PROGRAMS

The programs addressed in this section SHALL be established and implemented.

5.4.1 Radiation Protection Program

Roles, responsibilities, and requirements for radiation protection of AHCF personnel are described in the ES&H Manual Supplement *Radiological Protection Procedures Manual* (RPPM; SNL latest issue f). The radiological control program is described in Chapter 7 of the DSA.

Access controls SHALL be established for work on exposed sources behind the permanent shield wall and for in-air transfers.

5.4.2 Industrial Safety, Industrial Hygiene, and Fire Protection Programs

Industrial safety, fire protection, and industrial hygiene at the AHCF are implemented in accordance with the ES&H Manual (SNL latest issue c), which satisfies the worker-protection requirements of DOE Order 420.1A (DOE 2002). The requirements contained in these chapters are supplemented by requirements contained in ES&H Manual Supplements.

The ES&H Manual satisfies the fire protection requirements contained in DOE Order 420.1A (DOE 1996). Combustible and flammable materials SHALL be limited to materials necessary to AHCF operations to the extent practicable.

The SNL/NM Industrial Hygiene Program is also summarized in Section 8.3.1 of the DSA.

5.4.3 Conduct of Operations Program

Conduct of operations at the AHCF is implemented by means of the *Conduct of Operations Manual for Technical Area V (TA-V) Nuclear Facilities* (SNL latest issue b). The broad principles and objectives of this manual are that all work be managed with a consistent and auditable set of requirements, standards, and responsibilities that result in improved quality, reliability, and safety of operations. The procedures and instructions contained in this manual address each of the eighteen sections of DOE Order 5480.19 (DOE 1992). The Conduct of Operations for the AHCF is summarized in Section 8.6.1 of the AHCF DSA.

5.4.4 Maintenance Program

Maintenance at the AHCF is implemented by means of the SNL *Nuclear Facility Maintenance Implementation Plan (MIP)* (SNL latest issue e). This plan encompasses the requirements of Chapter II of DOE Order 4330.4B (DOE 1994) applicable to nuclear facilities. It addresses administrative, organizational, and implementation requirements, as well as the key functional interfaces with other site organizations that must be established and maintained.

The objective of the MIP is to achieve a balanced combination of written guidance, personnel skills, and supervision to establish and maintain a quality maintenance program to optimize critical system and equipment performance. The maintenance program for the AHCF is summarized in Section 8.5.3 of the AHCF DSA.

5.4.5 Configuration Management Program

Changes to the AHCF configuration are implemented by means of the *Conduct of Operations Manual for Technical Area V (TA-V) Nuclear Facilities* (SNL latest issue b) and guidance documents, such as *Implementing the Unreviewed Safety Question (USQ) Process for Nuclear Facilities* (SNL latest issue d). The Conduct of Operations Manual specifies the roles, responsibilities, and procedures for ensuring that any changes to the AHCF configuration receive appropriate safety and compliance reviews and proper management authorization. The USQ process ensures that proposed configuration changes satisfy DOE requirements.

5.4.6 Criticality Safety Program

Nuclear criticality safety at the AHCF is assured by implementation of the ES&H Manual Supplement, *Nuclear Criticality Safety* (Philbin 2003). This ES&H Manual supplement satisfies the nuclear criticality safety requirements of DOE Order 420.1, which in turn incorporates the requirements of the ANSI/ANS nuclear criticality safety standards. Criticality safety for the AHCF is summarized in Chapter 6 of the AHCF DSA.

A general criticality safety assessment (CSA) SHALL be prepared for the AHCF. A package-specific CSA SHALL be prepared for any package that is projected to be outside the safety envelope of the general CSA.

5.4.7 Emergency Preparedness Program

Emergency preparedness at the AHCF is assured by implementation of the *TA-V Emergency Preparedness Plan* (SNL latest issue i) and the *SNL/NM Emergency Plan* (SNL latest issue h).

The TA-V plan is an initial response plan. The integrated structure of the SNL Emergency Plan provides overall response to an incident. The Emergency Preparedness Program is summarized in Section 8.10 of the DSA.

5.4.8 Quality Assurance Program

Quality assurance at the AHCF is implemented by means of the *Sandia Research Reactor and Experimental Programs (RREP) Quality Assurance Program Plan (QAPP)* (SNL latest issue g). The RREP-QAPP addresses the quality assurance program requirements of DOE Order 414.1A (DOE 1999) and 10 CFR 830, Subpart A (CFR 2000a) and is based on Section II of ASME NQA-1 (ASME 1989) and ANSI/ANS-15.8-1995 (ANSI/ANS 1995). The Quality Assurance Program for the AHCF is summarized in Section 8.9 of the AHCF DSA.

5.5 MINIMUM OPERATIONS SHIFT COMPLEMENT

For OPERATIONS MODE in the hot cell, the minimum staffing SHALL include the following:

- One AHCF-qualified operator at the AHCF and one TA-V manager or an AHCF supervisor on call within TA-V, although not necessarily present in the AHCF at all times;

and

- A SNL-qualified radiological control technician available within TA-V, although not necessarily in the AHCF at all times.

For OPERATIONS MODE in the fume hood or temporary room, the minimum staffing SHALL include the following:

- An AHCF supervisor and an operator present at the AHCF (either of whom may briefly visit Building 6591);

or

- Two AHCF-qualified operators at the AHCF (either of whom may briefly visit Building 6591) and one TA-V manager or an AHCF supervisor on call within TA-V, although not necessarily present in the AHCF at all times;

and

- A SNL-qualified radiological control technician available within TA-V, although not necessarily in the AHCF at all times.

The package-specific work instructions may specify a greater staffing requirement as appropriate. AHCF operations will also comply with SNL's ES&H Manual (SNL latest issue c) for confined space and other operations requiring an attendant. There is no minimum staffing for WARM STANDBY and SHUTDOWN MODES.

5.6 STAFF QUALIFICATIONS AND TRAINING

Entry-level requirements for AHCF operating personnel are intended to assure that these personnel have the knowledge, skills, and abilities to operate and maintain the AHCF. This includes operating and maintaining related support systems and process equipment safely and reliably under all conditions. The minimum education and experience requirements for Manager, AHCF Supervisor, AHCF Operator, technical support staff and technicians are provided in the *Auxiliary Hot Cell Facility Operation Staff Training Requirements* (SNL latest issue a). Briefly, a bachelor of science in engineering or science plus one year nuclear facility experience (or equivalent training and experience) are the minimum requirements for Manager, and Technical Staff Member positions. The AHCF Supervisor, operators, and technician positions require a minimum of a high school diploma plus 1 year job-related practical experience (or equivalent training and experience).

The AHCF Supervisor and Operators are qualified positions that require successful completion of a formal training program before an individual is allowed to operate specific AHCF equipment or controls unsupervised. Proficiency for the qualified positions is demonstrated by minimum acceptable scores on written tests and by observation of the individual's operating skill with manipulators, process equipment, and plant safety equipment and safety systems. Qualification also requires demonstrated adherence to conduct of operations principles, and ability to follow procedures.

5.7 TSR BASES CONTROL

Changes to the TSR Bases SHALL NOT be made without prior DOE approval if the changes involve any of the following:

- A change in the TSR;
- A change to the DSA that involves a USQ; or
- A change to the way that OPERABILITY or the TSR could be met, applied, or interpreted.

5.8 REVIEW AND AUDITS

Primary responsibility for review of day-to-day activities is with the AHCF Supervisor and the AHCF Department Manager. Procedures written by the AHCF organization and approved by line management implement the conduct of operations review principles as prescribed in the *Conduct of Operations Manual for TA-V Nuclear Facilities* (SNL latest issue b). These procedures address all aspects of safe operation, configuration control, review and approvals, assignment and transfer of responsibilities, and performance assessment by management.

The Sandia Independent Review and Appraisal System (SIRAS) has been established to provide enhanced safety in nuclear facility operations and to ensure compliance with DOE orders. As part of the SIRAS, two safety committees—the Nuclear Facilities Safety Committee (NFSC) and the TA-V Radiological and Criticality Safety Committee (RCSC)—are established and maintained for

the purpose of advising line management on safety matters relating to operational activities at the AHCF.

The NFSC is chartered by and directly responsible to the Vice-president with line responsibility for the TA-V nuclear facilities. The NFSC acts in an advisory capacity to the line director responsible for the nuclear facilities. The subordinate facility safety committees (e.g., RCSC) are authorized to make recommendations to line management regarding the safety of matters that satisfy general criteria that have been reviewed by the NFSC and are delineated in the subordinate safety committee charter.

The RCSC is the basic internal safety review committee for AHCF activities, providing an independent safety review of proposed activities, facility modifications, and radiological and criticality safety. The committee advises line management and performs the following activities as set forth in an operational committee charter:

- Reviews proposed modifications to the AHCF;
- Reviews AHCF Procedures;
- Conducts detailed technical reviews of safety analysis documents; and
- Performs an annual review of AHCF operations involving radiological and criticality safety.

5.9 REPORTING REQUIREMENTS

Abnormal events and occurrences are investigated and reported and corrective action is taken in accordance with the SNL ES&H Manual.

5.10 OTHER WORKER SAFETY CONTROLS

5.10.1 Radiation Monitoring System

A radiation-monitoring system is operated in accordance with 10 CFR 835 (CFR 2000b) and the SNL Radiation Protection Program.

5.10.2 RADIOACTIVE MATERIAL Limits

RADIOACTIVE MATERIAL inventories in the AHCF SHALL be limited to less than the Hazard Category 2 threshold values in accordance with DOE-STD-1027 (DOE 1997) and LCO 3/4-2.3.

RADIOACTIVE MATERIAL within the AHCF SHALL not present an external radiation hazard exceeding that of a ~1.0 kCi source of aged mixed fission products.

SECTION 6

DESIGN FEATURES

6.0 BACKGROUND

This section describes the passive design features of the AHCF that, if altered or modified, would have a significant effect on safe operation. It describes those attributes of the hot cell, permanent shield wall, and external-silo shield plugs that are taken credit for in the accident analysis. These three design features are safety significant.

The trenches in the High Bay are a defense-in-depth design feature and are also described in this section.

These permanently built-in features require only infrequent, in-service surveillance.

6.1 HOT CELL

The existing hot cell was built in late 1996 to design criteria that included Seismic Zone 2b PC 2 requirements and 1994 UBC standards [SNL 1998]. The upgrades to the AHCF allow the hot cell to meet 1997 UBC standards, a code upgrade that influences the earthquake-design provisions and load factors. The design of hot cell mechanical and structural components meets worker safety requirements.

The dimensions and construction details of the hot cell are described in Section 2.4.2.1 of the AHCF DSA. Hot-cell equipment is described in Section 2.5.2. Hot-cell structural and mechanical components important to safety are described below.

- **Foundation/Floor:** A thick concrete foundation mat supports the hot cell. The floor inside the hot cell is raised above the floor level of Building 6597 to prevent radiation streaming under the walls.
- **Windows:** The hot-cell windows have a total attenuation of ~259-density-cm (102-density-in.), dominated by two panes of ~6.2-g/cc leaded glass. By comparison, the wall attenuation is ~216-density cm (85-density in.) As a result, the windows provide better shielding than the walls. Even if the oil were to leak from the windows, the attenuation would still be ~236-density cm (93-density in.), which is greater than the attenuation of the walls.
- **Window Frames:** The cold side of each window frame has a thick steel collar to prevent radiation streaming through the gaps between the window frame and the concrete walls. The hot side of the window frame has a step to accommodate the step in the window frame.
- **Manipulator Arm Sleeves:** Manipulators are used to handle packages inside the hot cell. The through-wall manipulator sleeves have been installed ~3 m (10 ft) above and horizontal to the floor. The manipulators contain internal shielding to minimize streaming; however, localized radiation fields in the vicinity of the manipulator pass-throughs are higher than those for the adjacent walls (AHCF DSA, Section 3.3.2.4). The

affected portion of the walls, approximately 3 m (10 ft) above floor level, is not normally occupied.

- **Pass-Throughs:** Wall pass-throughs other than manipulator arms and windows have at least a three-diameter serpentine offset to eliminate direct radiation streaming.
- **Roof:** Two roof panels of precast, reinforced concrete accommodate the roof openings. The modified roof is constructed of two reinforced concrete panels with a layer of sand between the panels. Each individual roof panel is designed to structurally support one ~2,300-kg (~5,000-lb) point load so that it can support a roof port and a roof plug.
- **Roof Openings and Plugs:** The two roof openings are positioned as close to the centerline of the windows as is structurally feasible. The internal silos are within the projected area of the roof openings, allowing the silos to be directly accessed from above. Because the roof plugs are thicker than the roof and they are made of solid normal-density concrete, they provide more shielding than the roof itself.
- **Internal Silos:** Two storage silos are aligned with the hot-cell windows and located below the roof openings, through which items can be lowered and inserted into the silos. Sources located in the silos inside the hot cell are shielded by the soil surrounding the sources as well as by the hot-cell walls. No chord through the soil is shorter than the distance through the hot cell, and the attenuation of soil and concrete are similar. Therefore, sources located in the hot-cell silos are shielded more than sources located in the hot cell itself.

6.2 SHIELD WALL

The permanent shield wall, adjacent to the hot cell, is constructed of solid normal-density concrete. It has a shielded viewing window. Master-slave manipulators are positioned above and to each side of the shielded viewing window. The dimensions and construction details of the permanent shield wall are described in Section 2.4.2.3 of the AHCF DSA.

6.3 EXTERNAL-SILO SHIELD PLUGS

Six external storage silos are located in the floor on the east side of the permanent shield wall. The storage silos were constructed as a unit and set into a pit, which was filled with concrete slurry to a level ~46 cm (~18 in.) below finished floor level. In accordance with ALARA principles, the silo pad is ~46 cm (18 in.) thick and constructed from high-density concrete fitted with rebar, and a steel surface plate is anchored to the high-density concrete. The silo pad and surface plate provide additional shielding of radiation sources in the silos to reduce radiation fields, but they are not safety-significant. The silo plugs are not water-tight; however, the silo pad is raised slightly above the general level of the High-Bay floor to inhibit entry of water into the silos. Criticality safety analyses for the AHCF assume flooding; therefore the height of the silo pad above the general floor level is not safety-significant.

Shield plugs for the external silos behind the permanent shield wall were constructed with lead encased in a steel shell. The plugs attenuate the collimated radiation from a source located down the hole.

6.4. BUILDING TRENCHES

A system of trenches in the High Bay and Mid Bay floor has a total collection capacity of approximately capacity of ~336,000 L (~90,000 gals). The trench system is adequate to contain fire-protection water generated by ~120 minutes of flow.

SURVEILLANCE REQUIREMENTS:

SR#	Surveillance	Frequency
6.1	VERIFY structural integrity of hot-cell shielding by external visual inspection	Quarterly
6.2	VERIFY structural integrity of permanent shield wall by visual inspection	Quarterly
6.3	VERIFY structural integrity of external-silo shield plug and collar by visual inspection	When shield plug is removed and individual silo is empty
6.4	VERIFY by visual inspection that trenches allow free entry of water to prevent ponding on the High-Bay floor and remain free of debris that would impair collection capacity	Quarterly

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(SNL latest issue e) Sandia National Laboratories, "Nuclear Facility Maintenance Implementation Plan," Sandia National Laboratories, Albuquerque, NM.

(SNL latest issue f) Sandia National Laboratories, "Radiological Protection Procedures Manual," MN471016, Sandia National Laboratories, Albuquerque, NM.

(SNL latest issue g) Sandia National Laboratories, *Sandia Research Reactor and Experimental Programs Quality Assurance Program Plan (RREP-QAPP),* Sandia National Laboratories, Albuquerque, NM.

(SNL latest issue h) Sandia National Laboratories, *SNL/NM Emergency Plan,* PN471011, Sandia National Laboratories, Albuquerque, NM.

(SNL latest issue i) Sandia National Laboratories, *TA-V Emergency Preparedness Plan*, Sandia National Laboratories, Albuquerque, NM.

APPENDIX A

BASES FOR THE TECHNICAL SAFETY REQUIREMENTS

3.0 GENERIC LIMITING CONDITIONS FOR OPERATION (LCOs)

LCOs 3.0.1 and 3.0.2 improve enforceability of the LCOs by explicitly requiring compliance with all of the individual LCO requirements (3.0.1) except when in an ACTION statement and within the completion time of the ACTION (LCO 3.0.2). Thus failure to meet an LCO is not a violation of the TSR unless corrective ACTIONS are not taken within the allowed time.

LCO 3.0.3 is a default ACTION requirement. If an LCO is not met and the associated ACTION statement cannot be met, the AHCF must be placed in a MODE in which the LCO does not apply.

LCO 3.0.4 prevents the AHCF from entering a MODE unless all LCOs are met without reliance on their ACTION statements, with certain exceptions. Thus a MODE usually cannot be entered if problems are already known to exist.

LCO 3.0.5 allows equipment to be placed in service for the purpose of testing.

LCO 3.0.6 limits the number of ACTION statements that must be met as a result of inoperability of a support system.

4.0 GENERIC SURVEILLANCE REQUIREMENTS (SRs)

SR 4.0.1 ensures that surveillances are performed at a frequency that supports correct operation of the AHCF.

SRs 4.0.2 and 4.0.3 allow some flexibility in surveillance frequencies in order to coordinate surveillances with AHCF operations and to allow for the timely recovery from an accidental omission of a surveillance.

SR 4.0.4 is parallel to LCO 3.0.4 in that it prevents entry into a MODE if surveillances have not been met.

3/4 LIMITING CONDITIONS FOR OPERATION

3/4.2.1 Ventilation System (IN-SERVICE) for Hot Cell

BACKGROUND The ventilation system provides a primary confinement barrier for radioactive particles in the AHCF. During waste- and material-handling operations in the hot cell, the ventilation system ensures that either Zone 1

is kept at a lower pressure than Zone 2 to minimize the spread of radioactive material to Zone 2 (roof plugs in place), or that adequate airflow is maintained to provide airflow from Zone 2 into Zone 1 (roof plugs removed). When the ventilation system is not IN-SERVICE, normal operations, such as repackaging of wastes, are not permitted in the hot cell, other than placing packages into a SAFE CONFIGURATION.

Operation of the ventilation system is not a prerequisite for activities outside the hot cell, fume hood, or temporary room that do not present a an airborne contamination hazard.

APPLICABLE SAFETY ANALYSIS

The hazards analysis in DSA Appendix 3-B credits the ventilation system for significant mitigation of risk to workers in scenarios where packages presenting contamination hazards are being processed.

LCO This LCO requires the ventilation system to be IN-SERVICE.

APPLICABILITY This LCO applies to the OPERATION MODE.

ACTIONS A.1

The requirement is to maintain the ventilation system IN-SERVICE during all operations that present an airborne contamination hazard. If ACTION A.1 cannot be completed satisfactorily, the required ACTION is to place the hot cell in WARM STANDBY MODE.

A.2.
The requirement to restore the HEPA filter bank to OPERABLE within 96 hours ensures that Zone-1 ventilation exhaust is filtered prior to release to the environment. This time period allows the operator to repair or replace the HEPA filter bank, in the case of malfunction at the beginning of a 3-day weekend, or time for grid power to resume, in the case of power outage. It also allows time to secure process materials prior to initiating a transition from warm standby to shutdown in the event of a sustained ventilation system outage or power outage.

A.3.
If the hot cell cannot be returned to OPERATION MODE within 96 hours, this ACTION ensures that the hot cell is placed in SHUTDOWN MODE in a timely manner.

B.1

The requirement to maintain a Zone-1 differential pressure measurement between 0.25 and 1.0 WC with hot cell roof plugs in place ensures that the

ventilation system is maintaining airflow in the correct direction to prevent diffusion of radioactively contaminated material to Zone 2. The minimum value of 0.25 WC is measurable and great enough to ensure airflow from Zone 2 into Zone 1 and through the HEPA filter bank. The maximum value of 1.0 WC is measurable and less than the maximum manufacturer-recommended pressure drop through the HEPA filter at an airflow of 1000 cfm. The required ACTION is to place the hot cell in WARM STANDBY MODE IMMEDIATELY if the pressure differential is outside the specified range. This action ensures that no operations take place while the pressure differential is incorrect, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION.

B.2.
The required ACTION is to restore the correct differential pressure. The time of 96 hours allows for recovery from upset conditions in ventilation system operation at the beginning of a 3-day weekend or from short-term loss of electrical power. It also allows time to secure process materials prior to initiating a transition from warm standby to shutdown in the event of a sustained loss of differential pressure or power outage.

B.3.
If the hot cell cannot be returned to OPERATION MODE within 96 hours, this ACTION ensures that the hot cell is placed in SHUTDOWN MODE in a timely manner.

C.1

The requirement to maintain the airflow in the Zone-1 between 10 and 1500 cfm with roof plugs removed prevents migration of radioactively contaminated material to Zone 2. The minimum value of 10 cfm is measurable and great enough to ensure airflow from Zone 2 into Zone 1 and through the HEPA filter bank. The maximum value of 1500 cfm is measurable and less than the maximum manufacturer-recommended flow through the HEPA filters; four HEPA filters are arranged in parallel, each with a maximum recommended airflow of 1100 cfm. The required ACTION is to place the hot cell in WARM STANDBY MODE IMMEDIATELY if airflow is outside the specified range. This action ensures that no operations take place while the pressure differential is incorrect, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION.

C.2.
The requirement to restore correct airflow measurement within 96 hours ensures that diffusion of radioactively contaminated material to Zone 2 is prevented. This time period allows the operator to replace the roof plugs in the case of power outage. It also allows time to secure process

materials prior to initiating a transition from warm standby to shutdown in the event of a sustained loss of power.

C.3.
If the hot cell cannot be returned to OPERATION MODE within 96 hours, this ACTION ensures that the hot cell is placed in SHUTDOWN MODE in a timely manner.

SURVEILLANCE REQUIREMENTS

4.2.1.1

This surveillance verifies that proper differential pressure is maintained while the roof plugs are in place. Daily surveillance has been specified because the surveillance is simple and provides a reliable indicator that the exhaust fan is working and air from the hot cell is being filtered.

4.2.1.2

This surveillance verifies that proper hot-cell ventilation airflow direction is being maintained when roof plugs are removed, as measured by an air-flow measuring station. Daily surveillance has been specified because the surveillance is simple and provides a reliable indicator that the exhaust fan is working and air from the hot cell is being filtered.

4.2.1.3

This surveillance verifies the OPERABILITY of the hot-cell airflow measurement CHANNEL (including alarms) used to perform surveillance SR 4.2.1.2. Quarterly surveillance is adequate to ensure that the pressure measurement CHANNELS are working as designed.

4.2.1.4

This surveillance verifies the OPERABILITY of the differential pressure measurement CHANNEL used to perform surveillance SR 4.2.1.1. Quarterly surveillance is adequate to ensure that the pressure measurement CHANNELS are working as designed.

4.2.1.5

This surveillance is required to VERIFY that a loss of hot-cell exhaust airflow initiates an alarm. Quarterly surveillance is adequate to ensure that the airflow measurement CHANNELS and alarm are working as designed.

4.2.1.6

CALIBRATION of the hot-cell airflow measurement CHANNEL used to perform SR 4.2.1.2 is required to ensure that the CHANNEL output corresponds with acceptable accuracy to the actual airflow. Annual calibration is adequate to ensure that the airflow measurement CHANNELS are working as designed.

4.2.1.7

Calibration of the Zone 1 vs. Zone 2 differential pressure measurement CHANNELS used to perform SR 4.2.1.1 is required to ensure that the CHANNEL output corresponds with acceptable accuracy to the actual differential pressure. Annual calibration is adequate to ensure that the pressure measurement CHANNELS are working as designed.

4.2.1.8

HEPA filters are in-place leak tested both when they are installed and periodically during service. In-place leak testing of HEPA filters is covered by ANSI-ASME N510-1980 and ASTM F 1471-93.

4.2.1.9

An annual in-place penetration test will ensure that particles are removed with an efficiency of at least 99% in accordance with ANSI-ASME N510-1980 and ASTM F 1471-93.

3/4.2.2 Ventilation System for Fume Hood or Temporary Room

BACKGROUND The ventilation system provides a primary confinement barrier for radioactive particles in the AHCF. During waste- and material-handling operations in the fume hood or temporary room, the ventilation system ensures that adequate airflow is maintained to provide airflow from Zone 2 into Zone 1. When the ventilation system is not IN-SERVICE, normal operations, such as repackaging of wastes, are not permitted in the fume hood or temporary room, other than placing packages into a SAFE CONFIGURATION.

Operation of the ventilation system is not a prerequisite for activities outside the hot cell, fume hood, or temporary room that do not present an airborne contamination hazard.

APPLICABLE SAFETY ANALYSIS

The hazards analysis in DSA Appendix 3-B credits the ventilation system for significant mitigation of risk to workers in scenarios where packages presenting contamination hazards are being processed.

LCO

This LCO requires the ventilation system to be IN-SERVICE for use of the fume hood or the temporary room, whichever is IN-SERVICE.

APPLICABILITY

This LCO applies to the OPERATION MODE.

ACTIONS

A.1

The requirement is to maintain the ventilation system IN-SERVICE during all operations that present an airborne contamination hazard. The required ACTION is to place the fume hood or temporary room, whichever is in use, in WARM STANDBY MODE IMMEDIATELY if the ventilation system becomes inoperable. This action ensures that no operations take place while the ventilation system is inoperable, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION.

A.2.

The requirement to restore the HEPA filter bank to OPERABLE within 96 hours ensures that Zone-1 ventilation exhaust is filtered prior to release to the environment. This time period allows the operator to repair or replace the exhaust fan or HEPA filter bank, in the case of malfunction at the beginning of a 3-day weekend, or time for grid power to resume, in the case of power outage. It also allows time to secure process materials prior to initiating a transition from warm standby to shutdown in the event of a sustained ventilation system outage or power outage.

A.3.

If the fume hood or temporary room cannot be returned to OPERATION MODE within 96 hours, this ACTION ensures that the fume hood or temporary room is placed in SHUTDOWN MODE in a timely manner.

B.1

The requirement to maintain a fume-hood face velocity >90 fpm ensures that airflow is in the correct direction, thereby preventing migration of radioactively contaminated material to Zone 2. The value of 90 fpm is consistent with recommendation of the Industrial Safety Council for local exhaust ventilation. The required ACTION is to place the fume hood in WARM STANDBY MODE IMMEDIATELY if airflow from Zone 2 to Zone 1 is lost. This action ensures that no operations take place while the airflow is incorrect, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION.

B.2.
The requirement to restore face velocity within 96 hours ensures that the ventilation system is maintaining airflow in the correct direction to prevent diffusion of radioactively contaminated material to Zone 2. This time period allows the operator to repair or replace the exhaust system, in the case of malfunction at the beginning of a 3-day weekend, or time for grid power to resume, in the case of power outage. It also allows time to secure process materials prior to initiating a transition from warm standby to shutdown in the event of a sustained ventilation system outage or loss power.

B.3.
If the face velocity cannot be restored within 96 hours, this ACTION ensures that the fume hood is placed in SHUTDOWN MODE in a timely manner.

C.1

This requirement that airflow through the temporary room in the Zone-1 ductwork is between 10 and 1500 cfm and within the temporary-room manufacturer's specifications when IN-SERVICE ensures that airflow is from a less-contaminated zone into an area of greater contamination and is exhausted through the HEPA filters. The range is measurable, and the reliance upon manufacturer specifications ensures the integrity of the temporary room. The maximum value of 1500 cfm is less than the maximum manufacturer-recommended flow through the HEPA filters; four HEPA filters are arranged in parallel, each with a maximum recommended airflow of 1100 cfm. Upon loss of this flow direction, the required ACTION is to place the temporary room in WARM STANDBY MODE IMMEDIATELY. This action ensures that no operations take place while airflow is from Zone 1 to Zone 2, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION.

C.2.
The requirement to restore airflow through the temporary room to the specified range within 96 hours ensures that the ventilation system is maintaining airflow in the correct direction to prevent diffusion of radioactively contaminated material to Zone 2. This time period allows the operator to repair or replace the exhaust system, in the case of malfunction at the beginning of a 3-day weekend, or time for grid power to resume, in the case of power outage. It also allows time to secure process materials prior to initiating a transition from warm standby to shutdown in the event of a sustained ventilation system outage or power outage.

C.3.
If airflow cannot be restored within 96 hours, this ACTION ensures that the temporary room is placed in SHUTDOWN MODE in a timely manner.

SURVEILLANCE REQUIREMENTS

4.2.2.1

This surveillance verifies that proper fume-hood face velocity is being maintained. Daily surveillance has been specified because the surveillance is simple and provides a reliable indicator that the exhaust fan is working and air from the fume hood or temporary room is being filtered.

4.2.2.2

This surveillance ensures airflow is in the correct direction to provide confinement for the temporary room. Daily surveillance has been specified because the surveillance is simple and provides a reliable indicator that the exhaust fan is working and air from the hot cell is being filtered.

4.2.2.3

This surveillance verifies the OPERABILITY of the fume-hood face-velocity measurement CHANNEL used to perform surveillance SR 4.2.2.1. Quarterly surveillance is adequate to ensure that the face-velocity measurement CHANNELS are working as designed.

4.2.2.4

This surveillance verifies the OPERABILITY of the temporary-room airflow measurement CHANNEL (including alarms) used to perform surveillance SR 4.2.2.2. Quarterly surveillance is adequate to ensure that the pressure measurement CHANNELS are working as designed.

4.2.2.5

This surveillance is required to VERIFY that a loss of exhaust airflow initiates an alarm. Quarterly surveillance is adequate to ensure that the alarm is working as designed.

4.2.2.6

CALIBRATION of the fume-hood face-velocity measurement CHANNEL used to perform SR 4.2.2.3 is required to ensure that the CHANNEL output corresponds with acceptable accuracy to the actual airflow. Annual calibration is adequate to ensure that the face-velocity measurement CHANNELS are working as designed.

4.2.2.7

HEPA filters are in-place leak tested both when they are installed and periodically during service. In-place leak testing of HEPA filters is covered by ANSI-ASME N510-1980 and ASTM F 1471-93.

4.2.2.8

An annual in-place penetration test will ensure that particles are removed with an efficiency of at least 99% in accordance with ANSI-ASME N510-1980 and ASTM F 1471-93.

3/4.2.3 RADIOACTIVE MATERIAL Inventory Limit

BACKGROUND Inventory control governs the location, storage configuration, and handling of nuclear material within the AHCF based on the quantity, type, and form. This element protects the assumptions of the hazard analysis that limit the amount of MAR available for potential release in the event of an accident.

Specific controls and restrictions are placed on the AHCF radiological material inventory to prevent the introduction of materials that would invalidate the safety basis.

APPLICABLE SAFETY ANALYSIS

The hazard analysis in Appendix 3-B credits inventory limits for significant reduction of risk to both worker and public in scenarios resulting in release of radioactive material.

LCO: This LCO requires that the total RADIOACTIVE MATERIAL inventory in the AHCF SHALL remain below the Hazard Category 2 threshold.

APPLICABILITY This LCO applies to the OPERATION, WARM STANDBY, and SHUT-DOWN MODES

A.1.
The total quantity of RADIOACTIVE MATERIAL that can be present in the AHCF is restricted to an amount less that the Hazard Category 2 threshold.

If the Hazard Category 2 threshold is exceeded, the requirement is to enter WARM STANDBY if in OPERATION, and stop all RADIOACTIVE MATERIAL handling sampling in the AHCF IMMEDIATELY, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION. This action ensures that no operations take place while the inventory is in excess of that analyzed in the safety basis, except to move RADIOACTIVE MATERIAL into a SAFE CONFIGURATION.

A.2.
The requirement is to develop and implement an approved plan to reduce the AHCF inventory below the Hazard Category 2 threshold before resuming OPERATION. This action ensures that no operations take place while the inventory is in excess of that analyzed in the safety basis and that the reduction in inventory will be accomplished in an orderly and safe manner and in accordance with all other applicable SNL/NM DSAs.

If the Hazard Category 2 threshold is exceeded by the contents of one container, the container or some part of the contents must be removed from the AHCF. If possible, the container should be closed and removed intact; however, if the container has been cut open, for example, it may be necessary to repackage the contents for removal. In the latter case, portions of the contents may be packaged and removed separately as appropriate to bring the total AHCF inventory below the Hazard Category 2 threshold. If the total AHCF inventory can be reduced below the Hazard Category 2 threshold by removing other containers in short-term storage at the AHCF, this is an acceptable means of completing the action.

Because a limited number of Hazard Category 2 nuclear facilities exist at SNL/NM, removal of the container from the AHCF will involve detailed planning. The time required for planning and removal of the excess material cannot be specified in advance, but the action must be performed before resuming operation.

SURVEILLANCE REQUIREMENTS

Performance of SR 4.2.3.1 assures that the AHCF complies with its designation as a Hazard Category 3 nuclear facility.

4.2.3.1

Performance of SR 4.2.3.2 “before receiving a new package” assures that preventive measures are taken to avoid the introduction of a package that will require an ACTION.

SURVEILLANCE REQUIREMENTS FOR DESIGN FEATURES

Surveillance requirements for design features are not required by DOE G 423.1-1; however, the guidance suggests that infrequent surveillance may be appropriate.

6.1

This surveillance verifies that hot-cell shielding capability is being maintained by means of an external quarterly visual inspection of structural integrity. Quarterly surveillance has been specified because the hot cell is a passive structure not subject to change by operations personnel. Because the hot cell is constructed of concrete, with leaded-glass windows, visual inspection is adequate to ascertain whether any compromise of structural integrity has occurred. External inspection has been specified to minimize the entry of personnel into the hot cell, in accordance with ALARA principles.

6.2

This surveillance verifies that permanent-shield-wall shielding capability is being maintained by means of a quarterly visual inspection of structural integrity. Quarterly surveillance has been specified because the permanent shield wall is a passive structure not subject to change by operations personnel. Because the permanent shield wall is constructed of concrete, with leaded-glass windows, visual inspection is adequate to ascertain whether any compromise of structural integrity has occurred.

6.3

This surveillance verifies that external-shield-plug shielding capability is being maintained by means of a visual inspection of structural integrity whenever the shield plug is removed and the silo is empty. This surveillance schedule has been specified for two reasons. First, the shield plugs are passive structures not subject to change by operations personnel. Second, removing the shield plug solely for the purposes of inspection while RADIOACTIVE MATERIAL is in storage would violate ALARA principles. Visual inspection is adequate to ascertain whether any compromise of structural integrity has occurred.

6.4

This surveillance verifies by means of a quarterly visual inspection that building trenches contribute to the prevention of criticality by preventing ponding on the High-Bay floor. Quarterly surveillance has been specified because the trenches are not subject to change by operations personnel.

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