APPENDIX

TECHNICAL SPECIFICATIONS
FOR THE
HUMBOLDT BAY
INDEPENDENT SPENT FUEL STORAGE INSTALLATION

Docket No. 72-27

Materials License No. SNM-2514

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1.0 USE AND APPLICATION

1.1 Definitions

--NOTE--
The defined terms of this section appear in capitalized type and are applicable throughout these Technical Specifications and Bases.

Term	Definition
ACTIONS	ACTIONS shall be that part of a Specification that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
DAMAGED FUEL ASSEMBLY	DAMAGED FUEL ASSEMBLIES are fuel assemblies with known or suspected cladding defects, as determined by a review of records, greater than pinhole leaks or hairline cracks; empty fuel rod locations that are not filled with solid Zircaloy or stainless steel rods; no longer in the form of an intact fuel assembly and consist of, or contain, debris such as loose fuel pellets, rod segments, etc.; or those that cannot be handled by normal means. This also includes fuel assemblies that are damaged in such a manner as to impair their structural integrity, or have missing or displaced structural components such as grid spacers. DAMAGED FUEL ASSEMBLIES must be stored in a DAMAGED FUEL CONTAINER.
DAMAGED FUEL CONTAINER (DFC)	DFCs are specially designed enclosures for DAMAGED FUEL ASSEMBLIES that permit gaseous and liquid media to escape to the atmosphere in the MPC-HB, while minimizing dispersal of gross particulates within the MPC-HB. A DFC can hold one DAMAGED FUEL ASSEMBLY comprised of material up to the equivalent of an INTACT FUEL ASSEMBLY.

(continued)

1.1 Definitions (continued)

INTACT FUEL ASSEMBLY	INTACT FUEL ASSEMBLY is a fuel assembly without known or suspected cladding defects greater than pinhole leaks or hairline cracks and which can be handled by normal means. A fuel assembly shall not be classified as INTACT FUEL ASSEMBLY unless solid Zircaloy or stainless steel rods are used to replace missing fuel rods and which displace an amount of water equal to that displaced by the original fuel rod(s).
LOADING OPERATIONS	LOADING OPERATIONS include all licensed activities on an SFSC while it is being loaded with its approved contents. LOADING OPERATIONS begin when the first fuel assembly is placed in the MPC and end when the SFSC is suspended from or secured on the transporter.
MULTI-PURPOSE CANISTER (MPC-HB)	MPC-HB is a sealed SPENT NUCLEAR FUEL container that consists of a honeycombed fuel basket contained in a cylindrical canister shell that is welded to a baseplate, lid with welded port cover plates, and closure ring. The MPC-HB provides the confinement boundary for the contained radioactive materials.
OPERABLE/OPERABILITY	A system, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instruments, controls, normal or emergency electrical power, and other auxiliary equipment that are required for the system, component, or device to perform its specific safety function(s) are also capable of performing their related support function(s).
OVERPACK	OVERPACK is a cask that receives and contains a sealed MPC-HB for transportation to and interim storage in the independent spent fuel storage installation (ISFSI). It provides the helium retention boundary, gamma and neutron shielding, protection against environmental phenomena, and a set of lifting trunnions for handling.

(continued)

1.1 Definitions (continued)

SPENT FUEL STORAGE CASKS (SFSCs)	SFSCs are containers approved for the storage of spent fuel assemblies at the ISFSI. The HI-STAR HB SFSC System consists of the OVERPACK and its integral MPC-HB.
SPENT NUCLEAR FUEL	SPENT NUCLEAR FUEL means fuel that has been withdrawn from a nuclear reactor following irradiation, has undergone at least one year's decay since being used as a source of energy in a power reactor and has not been chemically separated into its constituent elements by reprocessing. SPENT NUCLEAR FUEL includes the special nuclear material, byproduct material, source material, and other radioactive materials associated with fuel assemblies, including fuel channels.
STORAGE OPERATIONS	STORAGE OPERATIONS include all licensed activities that are performed at the ISFSI while at least one loaded SFSC is in place in the storage vault with the vault lid and all its lid bolts installed.
TRANSPORT OPERATIONS	TRANSPORT OPERATIONS include all licensed activities performed on an SFSC loaded with its approved contents when it is being moved to or from the ISFSI. TRANSPORT OPERATIONS begin when the loaded SFSC is first suspended from or secured to the transporter and end when the SFSC is at its destination and no longer secured on or suspended from the transporter.
UNLOADING OPERATIONS	UNLOADING OPERATIONS include all licensed activities on an SFSC while its contained MPC-HB is being unloaded of its approved contents. UNLOADING OPERATIONS begin when the SFSC is no longer suspended from the transporter and end when the last of its approved contents is removed from the MPC-HB.

1.0 USE AND APPLICATION

1.2 Logical Connectors

PURPOSE

The purpose of this section is to explain the meaning of logical connectors.

Logical connectors are used in Technical Specifications (TS) to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in TS are AND and OR. The physical arrangement of these connectors constitutes logical conventions with specific meanings.

BACKGROUND

Several levels of logic may be used to state Required Actions. 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 (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentions of the logical connectors.

When logical connectors are used to state a Condition, Completion Time, Surveillance, or Frequency, only the first level of logic is used, and the logical connector is left justified with the statement of the Condition, Completion Time, Surveillance, or Frequency.

EXAMPLES

The following examples illustrate the use of logical connectors.

EXAMPLE 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Verify AND A.2 Restore	

In this example, the logical connector AND is used to indicate that when in Condition A, both Required Actions A.1 and A.2 must be completed.

(continued)

1.2 Logical Connectors

EXAMPLES (continued)

EXAMPLE 1.2-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Stop OR A.2.1 Verify AND A.2.2.1 Reduce OR A.2.2.2 Perform OR A.3 Remove	

This example represents a more complicated use of logical connectors. Required Actions A.1, A.2, and A.3 are alternative choices, only one of which must be performed as indicated by the use of the logical connector OR and the left justified placement. Any one of these three ACTIONS may be chosen. If A.2 is chosen, then both A.2.1 and A.2.2 must be performed as indicated by the logical connector AND. Required Action A.2.2 is met by performing A.2.2.1 or A.2.2.2. The indented position of the logical connector OR indicates that A.2.2.1 and A.2.2.2 are alternative choices, only one of which must be performed.

1.0 USE AND APPLICATION

1.3 Completion Times

PURPOSE	The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.
BACKGROUND	Limiting Conditions for Operation (LCOs) specify the lowest functional capability or performance levels of equipment required for safe operation of the facility. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).
DESCRIPTION	The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., equipment or variable not within limits) that requires entering an ACTIONS condition unless otherwise specified, providing the cask system is in a specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the condition no longer exists or the cask system is not within the LCO Applicability. Once a Condition has been entered, subsequent subsystems, components, or variables expressed in the Condition, discovered to be not within limits, will not result in separate entry into the Condition unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.

(continued)

1.3 Completion Times (continued)

EXAMPLES

The following examples illustrate the use of Completion Times with different types of Conditions and changing Conditions.

EXAMPLE 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 Perform Action B.1 AND B.2 Perform Action B.2	12 hours 36 hours

Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to complete action B.1 within 12 hours AND complete action B.2 within 36 hours. A total of 12 hours is allowed for completion action B.1 and a total of 36 hours (not 48 hours) is allowed for completing action B.2 from the time that Condition B was entered. If action B.1 is completed within 6 hours, the time allowed for completing action B.2 is the next 30 hours because the total time allowed for completing action B.2 is 36 hours.

(continued)

1.3 Completion Times

EXAMPLES (continued)

EXAMPLE 1.3-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One system not within limit.	A.1 Restore system to within limit.	7 days
B. Required Action and associated Completion Time not met.	B.1 Complete action B.1. AND B.2 Complete action B.2.	12 hours 36 hours

When a system is determined not to meet the LCO, Condition A is entered. If the system is not restored within 7 days, Condition B is also entered and the Completion Time clocks for Required Actions B.1 and B.2 start. If the system is restored after Condition B is entered, Conditions A and B are exited, and therefore, the Required Actions of Condition B may be terminated.

(continued)

1.3 Completion Times

EXAMPLES (continued)

EXAMPLE 1.3-3

ACTIONS

---NOTE---
Separate Condition entry is allowed for each component.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Restore compliance with LCO.	4 hours
B. Required Action and associated Completion Time not met.	B.1 Complete action B.1 AND B.2 Complete action B.2	6 hours 12 hours

The Note above the ACTIONS table is a method of modifying how the Completion Time is tracked. If this method of modifying how the Completion Time is tracked was applicable only to a specific Condition, the Note would appear in that Condition rather than at the top of the ACTIONS Table.

The Note allows Condition A to be entered separately for each component, and Completion Times tracked on a per component basis. When a component is determined to not meet the LCO, Condition A is entered and its Completion Time starts. If subsequent components are determined to not meet the LCO, Condition A is entered for each component and separate Completion Times start and are tracked for each component.

IMMEDIATE COMPLETION TIME

When "Immediately" is used as a Completion Time, the Required Action should be pursued without delay and in a controlled manner.

1.0 USE AND APPLICATION

1.4 Frequency

PURPOSE	The purpose of this section is to define the proper use and application of Frequency requirements.
DESCRIPTION	Each Surveillance Requirement (SR) has a specified Frequency in which the Surveillance must be met in order to meet the associated Limiting Condition for Operation (LCO). An understanding of the correct application of the specified Frequency is necessary for compliance with the SR. The "specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Surveillance Requirement (SR) Applicability. The "specified Frequency" consists of the requirements of the Frequency column of each SR. Situations where a Surveillance could be required (i.e., its Frequency could expire), but where it is not possible or not desired that it be performed until sometime after the associated LCO is within its Applicability, represent potential SR 3.0.4 conflicts. To avoid these conflicts, the SR (i.e., the Surveillance or the Frequency) is stated such that it is only "required" when it can be and should be performed. With an SR satisfied, SR 3.0.4 imposes no restriction.

(continued)

1.4 Frequency (continued)

EXAMPLES

The following examples illustrate the various ways that frequencies are specified.

EXAMPLE 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify pressure within limit	12 hours

Example 1.4-1 contains the type of SR most often encountered in the Technical Specifications (TS). The Frequency specifies an interval (12 hours) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent interval. Although the Frequency is stated as 12 hours, an extension of the time interval to 1.25 times the interval specified in the Frequency is allowed by SR 3.0.2 for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1 (such as when the equipment or variables are outside specified limits, or the facility is outside the Applicability of the LCO). If the interval specified by SR 3.0.2 is exceeded while the facility is in a condition specified in the Applicability of the LCO, the LCO is not met in accordance with SR 3.0.1.

If the interval as specified by SR 3.0.2 is exceeded while the facility is not in a condition specified in the Applicability of the LCO for which performance of the SR is required, the Surveillance must be performed within the Frequency requirements of SR 3.0.2 prior to entry into the specified condition. Failure to do so would result in a violation of SR 3.0.4.

(continued)

1.4 Frequency

EXAMPLES (continued)

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify flow is within limits.	Once within 12 hours prior to starting activity AND 24 hours thereafter

Example 1.4-2 has two Frequencies. The first is a one-time performance Frequency, and the second is of the type shown in Example 1.4-1. The logical connector "AND" indicated that both Frequency requirements must be met. Each time the example activity is to be performed, the Surveillance must be performed within 12 hours prior to starting the activity.

The use of "once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND"). This type of Frequency does not qualify for the 25 percent extension allowed by SR 3.0.2.

"Thereafter" indicated future performances must be established per SR 3.0.2, but only after a specified condition is first met (i.e., the "once" performance in this example). If the specified activity is cancelled or not performed, the measurement of both intervals stops. New intervals start upon preparing to restart the specified activity.

2.0 APPROVED CONTENTS

2.1 Functional and Operating Limits

2.1.1 Spent Fuel To Be Stored

INTACT FUEL ASSEMBLIES and DAMAGED FUEL ASSEMBLIES meeting the limits specified in Tables 2.1-1 and 2.1-2 may be stored in the SFSC System.

2.1.2 GTCC Waste To Be Stored

Greater-than-Class-C (GTCC) waste meeting the description in Section 3.1 of the Humboldt Bay ISFSI SAR may be stored in one cask at the ISFSI.

2.2 Functional and Operating Limits Violations

If any Fuel Specifications or Loading Conditions of 2.1 are violated, the following ACTIONS shall be completed:

1. The affected fuel assemblies shall be placed in a safe condition.
2. Within 24 hours, notify the NRC Operations Center.
3. Within 30 days, submit a special report which describes the cause of the violation, and ACTIONS taken to restore compliance and prevent recurrence.

TABLE 2.1-1

MPC-HB-HB FUEL ASSEMBLY LIMITS

A. Allowable Contents (Notes 1 and 2)

1. Uranium oxide, INTACT FUEL ASSEMBLIES and DAMAGED FUEL ASSEMBLIES, with or without channels, meeting the criteria specified in Table 2.1-2 and the following specifications.

Cladding type	ZR (Notes 3 and 4)
Planar-Average Initial enrichment	$\leq$ 2.60 and $\geq$ 2.09 wt% ^{235}U.
Post-irradiation cooling time per assembly	$\geq$ 29 years
Average burnup per assembly	$\leq$ 23,000 MWD/MTU
Decay heat per assembly	$\leq$ 50 Watts
Decay heat per SFSC	$\leq$ 2000 Watts
Fuel assembly length	$\leq$ 96.91 inches (nominal design)
Fuel assembly width	$\leq$ 4.70 inches (nominal design)
Fuel assembly weight	$\leq$ 400 lb (including channel and DFC)

B. Quantity per MPC-HB: Up to 80 fuel assemblies.

C. DAMAGED FUEL ASSEMBLIES must be stored in a DAMAGED FUEL CONTAINER. Allowable Loading Configurations: Up to 28 DAMAGED FUEL ASSEMBLIES in DAMAGED FUEL CONTAINERS, can be stored in the peripheral fuel storage locations as shown in Figure 2.1-1, or up to 40 DAMAGED FUEL ASSEMBLIES in DAMAGED FUEL CONTAINERS, can be stored in a checkerboard pattern as shown in Figure 2.1-2. The remaining fuel storage locations may be filled with INTACT FUEL assemblies meeting the above applicable specifications, or with INTACT FUEL assemblies optionally stored in DFCs.

<u>NOTE 1</u>: Fuel assemblies with channels may be stored in any fuel cell location.

<u>NOTE 2</u>: The total quantity of damaged fuel permitted in a single DAMAGED FUEL CONTAINER is limited to the equivalent weight and special nuclear material quantity of one intact fuel assembly.

<u>NOTE 3</u>: ZR means any-zirconium-based fuel cladding material authorized for use in a commercial nuclear power plant reactor.

<u>NOTE 4</u>: Storage as a DAMAGED FUEL ASSEMBLY of material in the form of loose debris consisting of zirconium clad pellets, stainless steel clad pellets, unclad pellets or rod segments up to a maximum of one equivalent fuel assembly is allowed.

TABLE 2.1-2

FUEL ASSEMBLY CHARACTERISTICS (Note 1)

Fuel Assembly Type	GE Type II	GE Type III, Exxon Type III & IV
Design Initial U (kg/assy.)	≤ 78	≤ 78
No. of Fuel Rods	49	36
Fuel Rod Cladding O.D. (in.)	≥ 0.486	≥ 0.5585
Fuel Rod Cladding I.D. (in.)	≤ 0.426	≤ 0.505
Fuel Pellet Dia. (in.)	≤ 0.411	≤ 0.488
Fuel Rod Pitch (in.)	≤ 0.631	≤ 0.740
Active Fuel Length (in.)	≤ 80	≤ 80
No. of water rods	0	0
Channel Thickness (in)	0.060	0.060

NOTE 1: All dimensions are design nominal values. Maximum and minimum dimensions are specified to bound variations in design nominal values among fuel assemblies.

FIGURE 2.1-1

CONFIGURATION 1: DAMAGED FUEL IN
PERIPHERAL CELLS OF BASKET ONLY

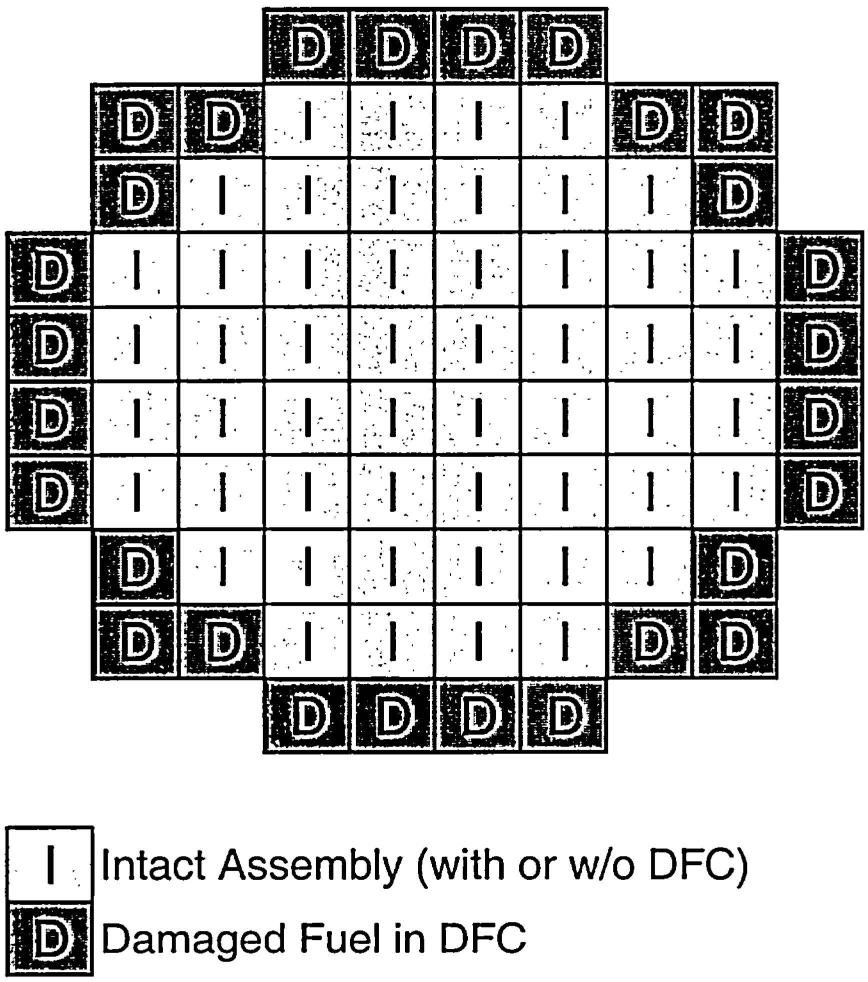
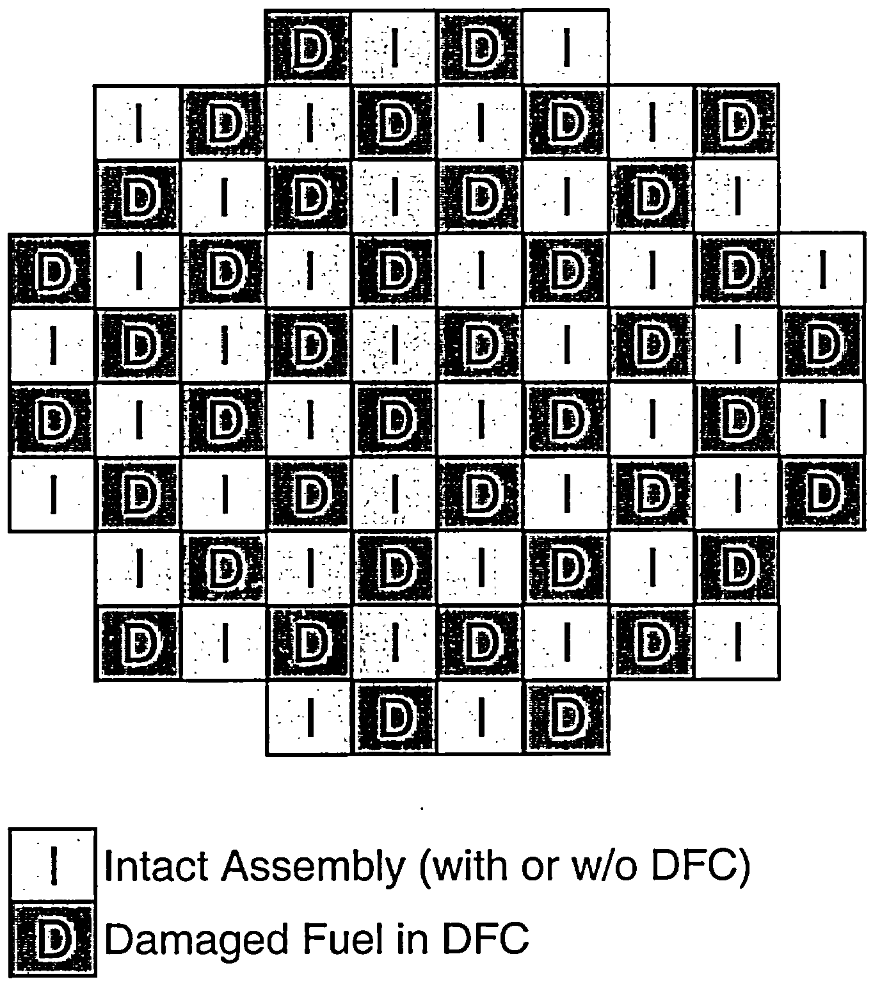


FIGURE 2.1-2

CONFIGURATION 2: CHECKERBOARD OF DAMAGED FUEL AND INTACT FUEL



3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1	LCOs shall be met during specified conditions in the Applicability, except as provided in LCO 3.0.2
LCO 3.0.2	Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met. If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.
LCO 3.0.3	Not applicable.
LCO 3.0.4	When an LCO is not met, entry into a specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS or that are related to the unloading of an SFSC.
LCO 3.0.5	Not applicable.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1	SRs shall be met during specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on equipment or variables outside specified limits.
SR 3.0.2	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. For Frequencies specified as "once," the above interval extension does not apply. If a Completion Time requires periodic performance on a "once per ..." basis, the above Frequency extension applies to each performance after the initial performance. Exceptions to this Specification are stated in the individual Specifications.
SR 3.0.3	If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO 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 must immediately be declared not met, and the applicable Condition(s) must be entered. When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.
SR 3.0.4	Entry into a specified condition in the Applicability of an LCO shall not be made unless the LCOs Surveillances have been met within their specified Frequency. This provision shall not prevent entry into specified conditions in the Applicability that are required to comply with Actions or that are related to the unloading of an SFSC.

3.1 SFSC INTEGRITY

3.1.1 MULTI-PURPOSE CANISTER (MPC-HB)

LCO 3.1.1 The MPC-HB shall be dry and helium filled.

APPLICABILITY: During TRANSPORT OPERATIONS and STORAGE OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each MPC-HB

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. MPC-HB cavity drying acceptance criterion not met.	A.1. Perform an engineering evaluation to determine the quantity of moisture left in the MPC-HB.	7 days
	AND	
	A.2 Develop and initiate corrective actions necessary to return the MPC-HB to an analyzed condition.	30 days
B. MPC-HB helium backfill pressure limit not met.	B.1 Perform an engineering evaluation to determine the impact of helium pressure differential.	72 hours
	AND	
	B.2 Develop and initiate corrective actions necessary to return the MPC-HB to an analyzed condition.	14 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. MPC-HB helium leak rate limit for vent and drain port cover plate welds not met.	C.1 Perform an engineering evaluation to determine the impact of increased helium leak rate on heat removal capacity.	24 hours
	AND	
	C.2 Develop and initiate corrective actions necessary to return the MPC-HB to an analyzed condition.	7 days
D. Required Actions and associated Completion Times not met.	D.1 Remove all fuel assemblies from the MPC-HB.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify MPC-HB cavity vacuum drying pressure is ≤ 3 torr for ≥ 30 min. OR While recirculating helium through the MPC-HB cavity, verify that the gas temperature exiting the demoisturizer is ≤ 21°F for ≥ 30 min or the dew point of the gas exiting the MPC is ≤ 22.9°F for ≥ 30 min.	Once, prior to TRANSPORT OPERATIONS.
SR 3.1.1.2	Verify MPC-HB helium backfill pressure is ≥ 45.2 psig and ≤ 48.8 psig at a reference temperature of 70°F.	Once, prior to TRANSPORT OPERATIONS.
SR 3.1.1.3	Verify that the total helium leak rate through the MPC-HB vent and drain port cover plate welds is ≤ 1.0E-7 atm-cc/sec (He).	Once, prior to TRANSPORT OPERATIONS.

3.1 SFSC INTEGRITY

3.1.2 OVERPACK Heat Removal System

LCO 3.1.2 The OVERPACK shall be dry and helium filled.

APPLICABILITY: During TRANSPORT OPERATIONS and STORAGE OPERATIONS

ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each OVERPACK

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. OVERPACK annulus drying acceptance criterion not met.	A.1. Perform an engineering evaluation to determine the quantity of moisture left in the OVERPACK.	7 days
	AND	
	A.2 Develop and initiate corrective actions necessary to return the OVERPACK to an analyzed condition.	30 days
B. OVERPACK annulus helium backfill pressure limit not met.	B.1 Perform an engineering evaluation to determine the impact of helium pressure differential.	72 hours
	AND	
	B.2 Develop and initiate corrective actions necessary to return the OVERPACK to an analyzed condition.	30 days
C. OVERPACK helium leak rate limit not met	C.1 Perform an engineering evaluation to determine impact of increased helium leak rate on heat removal capability and off-site dose release effects.	7 days
	AND	
	C.2 Develop and initiate corrective actions necessary to return the OVERPACK to analyzed condition.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	Verify OVERPACK annulus vacuum drying pressure is $\leq$ 3 torr for $\geq$ 30 min.	Once, prior to TRANSPORT OPERATIONS
SR 3.1.2.2	Verify OVERPACK annulus helium backfill pressure is $\geq$ 10 psig and $\leq$ 14 psig	Once, prior to TRANSPORT OPERATIONS
SR 3.1.2.3	Verify that the total helium leak rate through the OVERPACK closure plate inner mechanical seal, the OVERPACK vent port plug seal and the OVERPACK drain port plug seal is $\leq$ 4.3E-6 atm-cc/sec (He).	Once, prior to TRANSPORT OPERATIONS

3.1 SFSC INTEGRITY

3.1.3 Fuel Cool-Down

LCO 3.1.3 The MPC-HB cavity bulk helium temperature shall be ≤ 200°F.

---NOTE---

The LCO is only applicable to wet UNLOADING OPERATIONS.

APPLICABILITY: During UNLOADING OPERATIONS prior to re-flooding.

ACTIONS

---NOTE---

Separate Condition entry is allowed for each MPC-HB

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. MPC-HB cavity bulk Helium temperature not within limit.	A.1 Establish MPC-HB cavity bulk Helium temperature within limit.	Prior to initiating MPC-HB re-flooding operations.
	<u>AND</u>	
	A.2 Ensure adequate heat transfer from the MPC-HB to the environment	24 hours

<u>SURVEILLANCE REQUIREMENTS</u>

SURVEILLANCE	FREQUENCY
SR 3.1.3.1 Ensure via analysis or direct measurement that the MPC-HB cavity bulk helium temperature is ≤ 200°F.	Prior to MPC-HB re-flooding operations.

4.0 DESIGN FEATURES

4.1 Design Features Significant to Safety

4.1.1 Criticality Control

a. MULTI-PURPOSE CANISTER (MPC-HB) MPC-HB

1. Fuel cell pitch: $\geq$ 5.83 in.

2. ^{10}B loading in the neutron absorbers: $\geq$ 0.01 g/cm^2

4.2 Codes and Standards

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 1995 Edition with Addenda through 1997, is the governing Code for the HI-STAR HB System, except for Sections V and IX. For activities governed by Section V and IX, the latest effective Code Edition is applicable.

Any specific alternatives to these codes and standards, and the codes and standards for other components followed for the Humboldt Bay ISFSI storage system, are provided in the Humboldt Bay ISFSI Safety Analysis Report (SAR).

4.2.1 Alternatives to Design Codes, Standards, and Criteria

Approved alternatives to the ASME Code are listed in SAR Table 3.4-5. Changes to these alternatives or new alternatives may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The licensee should demonstrate that:

a. The proposed alternative would provide an acceptable level of quality and safety, or

b. Compliance with the specified requirements of the ASME Code would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for alternatives as described in this section shall be submitted in accordance with 10 CFR 72.4.

(continued)

4.0 DESIGN FEATURES (continued)

4.3 Cask Handling

4.3.1 Cask Transporter

A cask transporter is used to transport the SFSC between the power plant and the ISFSI. The requirements for the cask transporter are as follows:

a. Except for the period of time in which the loaded SFSC is being moved on the rail dolly, TRANSPORT OPERATIONS shall be conducted using the cask transporter.

b. The cask transporter fuel tank shall not contain > 50 gallons of diesel fuel at any time.

c. The cask transporter shall be designed, fabricated, inspected, maintained, operated, and tested in accordance with the applicable guidelines of NUREG-0612.

d. The cask transporter lifting towers shall have redundant drop protection features.

4.3.2 Storage Capacity

The Humboldt Bay ISFSI can accommodate up to 400 spent fuel assemblies. The ISFSI storage capacity can accommodate up to six SFSCs.

4.3.3 SFSC Load Handling Equipment

Lifting of a SFSC outside of structures governed by 10 CFR 50 shall be performed with load handling equipment that is designed, fabricated, inspected, maintained, operated and tested in accordance with the applicable guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants".

5.0 ADMINISTRATIVE CONTROLS

5.1 Administrative Programs

The following programs shall be established, implemented, and maintained:

5.1.1 Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these TS.

a. Changes to the TS Bases shall be made under appropriate administrative controls and reviews.

b. Changes to the TS Bases may be made without prior NRC approval in accordance with the criteria in 10 CFR 72.48.

c. The TS Bases Control Program shall contain provisions to ensure that the TS Bases are maintained consistent with the Humboldt Bay ISFSI SAR.

d. Proposed changes that do not meet the criteria of 5.5.1.b above shall be reviewed and approved by the NRC prior to implementation. Changes to the TS Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 72.48 (d) (2).

5.1.2 Radioactive Effluent Control Program

a. This program is established and maintained to implement the requirements of 10 CFR 72.44 (d) or 72.126, as appropriate.

b. This program will provide limits on surface contamination of the OVERPACK and GTCC cask and verification of meeting those limits prior to removal of a loaded OVERPACK or GTCC cask from the refueling building.

5.1.3 MPC-HB and SFSC Loading, Unloading, and Preparation Program

This program shall be established and maintained to implement Humboldt Bay ISFSI SAR Section 10.2 requirements for loading fuel and components into MPC-HBs, unloading fuel and components from MPC-HBs, and preparing the MPC-HBs for storage in the SFSCs. The requirements of the program for loading and preparing the MPC-HB shall be complete prior to removing the MPC-HB from the Refueling Building. The program provides for evaluation and control of the following requirements during the applicable operation:

a. Verify that the acceptance criteria for drying are met to ensure short term fuel temperature limits are not violated and the MPC-HB and OVERPACK are adequately dry.

b. Verify that the MPC-HB and OVERPACK inerting backfill pressures and purity assure adequate heat transfer and corrosion control.

c. Verify that leak testing assures adequate OVERPACK integrity.

d. Verify surface dose rates on the SFSCs are consistent with the offsite dose analysis.

e. During MPC-HB re-flooding, verify the MPC cavity bulk helium temperature is such that water quenching or flashing does not occur.

f. Loading is to be independently verified by a cognizant engineer to ensure that the fuel assemblies in the MPCs are placed in accordance with the original loading plan.

(continued)

5.0 ADMINISTRATIVE CONTROLS (continued)

5.1.4 ISFSI Operations Program

This program will implement the Humboldt Bay ISFSI SAR requirements for ISFSI operations. It will include criteria to be verified and controlled:

a. SFSC cask storage location.

b. Design features listed in Section 4.0 and design basis ISFSI parameters consistent with the Humboldt Bay ISFSI SAR analysis.

5.1.5 Cask Transportation Evaluation Program

This program will evaluate and control the transportation of loaded SFSCs between the HBPP Refueling Building and the ISFSI storage vault. Included in this program will be pre-transport evaluation and control during transportation of the following:

- Transportation route road surface conditions.
- Onsite hazards along the transportation route.
- Security, including control of the 100 meter boundary.
- Transporter control functions and operability.
- Offsite marine hazards from barge transport.
- Severe weather.

5.1.6 GTCC Cask Loading and Preparation Program

This program shall be established and maintained to implement Humboldt Bay ISFSI SAR Section 3.1 requirements for loading a GTCC cask and preparing the GTCC cask for storage in the ISFSI. The requirements of the program for loading and preparing the GTCC cask shall be complete prior to removing the GTCC cask from the refueling building. The program provides for evaluation and control of the following requirements during the applicable operation:

a. Verify surface dose rates on the GTCC cask are consistent with the offsite dose analysis.

b. Verify that any effluents from the GTCC cask comply with 10 CFR 20 requirements.

TECHNICAL SPECIFICATION BASES

FOR THE

HUMBOLDT BAY

INDEPENDENT SPENT FUEL STORAGE INSTALLATION

Docket No. 72-27

Materials License No. SNM-2514

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B 3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

BASES

LCO	LCO 3.0.1, 3.0.2, and 3.0.4 establish the general requirements applicable to all Specifications and apply at all times, unless otherwise stated.
LCO 3.0.1	LCO 3.0.1 establishes the Applicability statement within each individual Specification as the requirement for when the LCO is required to be met (i.e., when the facility is in the specified conditions of the Applicability statement of each Specification).

LCO 3.0.2

LCO 3.0.2 establishes that upon discovery of a failure to meet an LCO, the associated ACTIONS shall be met. The Completion Time of each Required Action for an ACTIONS condition is applicable from the point in time that an ACTIONS condition is entered. The Required Actions establish those remedial measures that must be taken within specified Completion Times when the requirements of an LCO are not met. This Specification establishes that:

a. Completion of the Required Actions within the specified Completion Times constitutes compliance with a Specification; and

b. Completion of the Required Actions is not required when an LCO is met within the specified Completion Time, unless otherwise specified.

There are two basic types of Required Actions. The first type of Required Action specifies a time limit in which the LCO must be met. This time limit is the Completion Time to restore a system or component or to restore variables to within specified limits. Whether stated as a Required Action or not, correction of the entered condition is an action that may always be considered upon entering ACTIONS. The second type of Required Action specifies the remedial measures that permit continued operation that is not further restricted by the Completion Time. In this case, compliance with the Required Actions provides an acceptable level of safety for continued operation.

Completing the Required Actions is not required when an LCO is met or is no longer applicable, unless otherwise stated in the individual Specifications.

The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally. The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of Surveillances, preventive maintenance, corrective maintenance, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience.

(continued)

BASES (continued)

LCO 3.0.3	This specification is not applicable to the Humboldt Bay ISFSI because it describes conditions under which a power reactor must be shut down when an LCO is not met and an associated ACTION is not met or provided. The placeholder is retained for consistency with the power reactor technical specifications.
LCO 3.0.4	LCO 3.0.4 establishes limitations on changes in specified conditions in the Applicability when an LCO is not met. It precludes placing the facility in a specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist: a. Facility conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered; and b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in being required to exit the Applicability desired to be entered to comply with the Required Actions. Compliance with Required Actions that permit continued operation of the facility for an unlimited period of time in a specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the facility. Therefore, in such cases, entry into a specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components before entering an associated specified condition in the Applicability. The provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS, or that are related to the unloading of an SFSC Exceptions to LCO 3.0.4 are stated in the individual Specifications. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.
LCO 3.0.5	This specification is not applicable to the Humboldt Bay ISFSI because it describes conditions under which a power reactor must be shut down when an LCO is not met and an associated ACTION is not met or provided. The placeholder is retained for consistency with the power reactor technical specifications.

B 3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

BASES

SRs	SR 3.0.1 through SR 3.0.4 establish the general requirements applicable to all Specifications and apply at all times, unless otherwise stated.

SR 3.0.1

SR 3.0.1 establishes the requirement that SRs must be met during the specified conditions in the Applicability for which the requirements of the LCO apply, unless otherwise specified in the individual SRs. This Specification is to ensure that Surveillances are performed to verify that systems and components meet the LCO and variables are within specified limits. Failure to complete a Surveillance within the specified Frequency, in accordance with SR 3.0.2, constitutes a failure to meet an LCO.

Systems and components are assumed to meet the LCO when the associated SRs have been met. Nothing in this Specification, however, is to be construed as implying that systems or components meet the associated LCO when:

a. The systems or components are known to not meet the LCO, although still meeting the SRs; or

b. The requirements of the Surveillance(s) are known to be not met between required Surveillance performances.

Surveillances do not have to be performed when the facility is in a specified condition for which the requirements of the associated LCO are not applicable, unless otherwise specified.

Surveillances including Surveillances invoked by Required Actions, do not have to be performed on equipment that has been determined to not meet the LCO because the ACTIONS define the remedial measures that apply. Surveillances have to be met and performed in accordance with SR 3.0.2, prior to returning equipment to service. Upon completion of maintenance, appropriate post-maintenance testing is required. This includes ensuring applicable Surveillances are not failed and their most recent performance is in accordance with SR 3.0.2.

Post-maintenance testing may not be possible in the current specified conditions in the Applicability due to the necessary facility parameters not having been established. In these situations, the equipment may be considered to meet the LCO provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a specified condition where other necessary post-maintenance tests can be completed.

(continued)

BASES (continued)

SR 3.0.2

SR 3.0.2 establishes the requirements for meeting the specified Frequency for Surveillances and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per....." interval.

SR 3.0.2 permits a 25% extension of the interval specified in the Frequency. This extension facilitates Surveillance scheduling and considers facility conditions that may be suitable for conducting the Surveillance (e.g., transient conditions or other ongoing Surveillance or maintenance activities).

The 25% extension does not significantly degrade the reliability that results from performing the Surveillance at its specified Frequency. This is based on the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with SRs. The exceptions to SR 3.0.2 are those Surveillances for which the 25% extension of the interval specified in the Frequency does not apply. These exceptions are stated in the individual Specifications as a Note in the Frequency stating, "SR 3.0.2 is not applicable."

As stated in SR 3.0.2, the 25% extension also does not apply to the initial portion of a periodic Completion Time that requires performance on a "once per ...." basis. The 25% extension applies to each performance after the initial performance. The initial performance of the Required Action, whether it is a particular Surveillance or some other remedial action, is considered a single action with a single Completion Time. One reason for not allowing the 25% extension to this Completion Time is that such an action usually verifies that no loss of function has occurred by checking the status of redundant or diverse components or accomplishes the function of the affected equipment in an alternative manner.

The provisions of SR 3.0.2 are not intended to be used repeatedly merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

(continued)

BASES (continued)

SR 3.0.3

SR 3.0.3 establishes the flexibility to defer declaring affected equipment as not meeting the LCO or an affected variable outside the specified limits when a Surveillance has not been completed within the specified Frequency. A delay period of up to 24 hours or up to the limit of the specified Frequency, whichever is less, applies from the point in time that it is discovered that the Surveillance has not been performed in accordance with SR 3.0.2, and not at the time that the specified frequency was not met.

This delay period provides adequate time to complete Surveillances that have been missed. This delay period permits the completion of a Surveillance before complying with Required Actions or other remedial measures that might preclude completion of the Surveillance.

The basis for this delay period includes consideration of facility conditions, adequate planning, availability of personnel, the time required to perform the Surveillance, the safety significance of the delay in completing the required Surveillance, and the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the requirements. When a Surveillance with a Frequency based not on time intervals, but upon specified facility conditions, is discovered not to have been performed when specified, SR 3.0.3 allows the full delay period of 24 hours to perform the Surveillance.

SR 3.0.3 also provides a time limit for completion of Surveillances that become applicable as a consequence of changes in the specified conditions in the Applicability imposed by the Required Actions.

Failure to comply with specified Frequencies for SRs is expected to be an infrequent occurrence. Use of the delay period established by SR 3.0.3 is a flexibility, which is not intended to be used as an operational convenience to extend Surveillance intervals.

If a Surveillance is not complete within the allowed delay period, then the equipment is considered to not meet the LCO or the variable is considered outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon expiration of the delay period. If a Surveillance is failed within the delay period, then the equipment does not meet the LCO, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon the failure of the Surveillance.

Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1.

(continued)

BASES (continued)

SR 3.0.4

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a specified condition in the Applicability.

This Specification ensures that system and component requirements and variable limits are met before entry into specified conditions in the Applicability for which these systems and components ensure safe operation of the facility.

The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components before entering an associated specified condition in the Applicability.

However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a change in specified condition. When a system, subsystem, division, component, device, or variable is outside the specified limits, the associated SR(s) are not required to be performed per SR 3.0.1, which states that Surveillances do not have to be performed on equipment that has been determined to not meet the LCO. When equipment does not meet the LCO, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to specified condition changes.

The provisions of SR 3.0.4 shall not prevent changes in specified conditions in the Applicability that are required to comply with ACTIONS.

The precise requirements of performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs annotation is found in Humboldt Bay ISFSI Technical Specification Section 1.4, Frequency.

B 3.1 SPENT FUEL STORAGE CASK (SFSC) INTEGRITY

B 3.1.1 Multi-Purpose Canister (MPC)

BASES

BACKGROUND

A SFSC (HI-STAR HB OVERPACK with an empty MPC) is placed in the spent fuel pool and loaded with fuel assemblies meeting the requirements of TS Section 2.0, Approved Contents. A lid is then placed on the MPC. An MPC lid retention device is placed over the lid and attached to the HI-STAR HB OVERPACK. The SFSC is raised to the top of the spent fuel pool surface. The SFSC is then moved into the cask washdown area where dose rates are measured and the MPC lid is welded to the MPC shell and the welds are inspected and tested. The water is drained from the MPC cavity and moisture removal performed. The MPC cavity is backfilled with helium. Additional dose rates are measured and the MPC vent and drain cover plates and closure ring are installed and welded. Inspections are performed on the welds.

MPC cavity moisture removal using vacuum drying or forced helium recirculation is performed to remove residual moisture from the MPC fuel cavity after the MPC has been drained of water. If vacuum drying is used, any water that has not drained from the fuel cavity evaporates from the fuel cavity due to the vacuum. This is aided by the temperature increase due to the decay heat of the fuel.

If helium recirculation is used, the dry gas introduced to the MPC cavity through the vent and drain port absorbs the residual moisture in the MPC. This humidified gas exits the MPC via the other port and the absorbed water is removed through condensation and/or mechanical drying. The dried helium is then forced back though the MPC until the temperature acceptance limit is met.

After the completion of moisture removal, the MPC cavity is backfilled with helium meeting the backfill pressure requirements of the SR.

Backfilling of the MPC fuel cavity with helium promotes gaseous heat dissipation and the inert atmosphere protects the fuel cladding.

(continued)

BASES

APPLICABLE SAFETY ANALYSIS	The confinement of radioactivity during the storage of spent fuel in the MPC is ensured by the multiple confinement boundaries and systems. The barriers relied on are the fuel pellet matrix, the metallic fuel cladding tubes in which the fuel pellets are contained, and the MPC in which the fuel assemblies are stored. Long-term integrity of the fuel and cladding depends on storage in an inert atmosphere. This is accomplished by removing water from the MPC and backfilling the cavity with an inert gas. The thermal analyses of the MPC assume that the MPC cavity is filled with dry helium of a minimum quality to ensure the assumptions used for convection heat transfer are preserved. Keeping the backfill pressure below the maximum value preserves the initial condition assumptions made in the MPC over-pressurization evaluation.
LCO	A dry, helium filled, and sealed MPC establishes an inert heat removal environment necessary to ensure the integrity of the multiple confinement boundaries.
APPLICABILITY	The dry, sealed and inert atmosphere is required to be in place during TRANSPORT OPERATIONS and STORAGE OPERATIONS to ensure both the confinement barriers and heat removal mechanisms are in place during these operating periods. These conditions are not required during LOADING OPERATIONS or UNLOADING OPERATIONS as these conditions are being established or removed, respectively during these periods in support of other activities being performed with the stored fuel.
ACTIONS	A note has been added to the ACTIONS, which states that, for this LCO, separate Condition entry is allowed for each MPC. This is acceptable since the Required Actions for each Condition provide appropriate compensatory measures for each MPC not meeting the LCO. Subsequent MPCs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. <u>A.1</u> If the cavity drying criteria has been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the potential quantity of moisture left within the MPC cavity. Since moisture remaining in the cavity during these modes of operation may represent a long-term degradation concern, immediate action is not necessary. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

(continued)

BASES

ACTIONS (continued)

A.2

Once the quantity of moisture potentially left in the MPC cavity is determined, a corrective action plan shall be developed and actions initiated to the extent necessary to return the MPC to an analyzed condition. Since the quantity of moisture estimated under Required Action A.1 can range over a broad scale, different recovery strategies may be necessary. Since moisture remaining in the cavity during these modes of operation may represent a long-term degradation concern, immediate action is not necessary. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.

B.1

If the helium backfill pressure limit has been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the quantity of helium within the MPC cavity. Since too much or too little helium in the MPC during these modes represents a potential overpressure or heat removal degradation concern, an engineering evaluation shall be performed in a timely manner. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

B.2

Once the quantity of helium in the MPC cavity is determined, a corrective action plan shall be developed and initiated to the extent necessary to return the MPC to an analyzed condition. Since the quantity of helium estimated under Required Action B.1 can range over a broad scale, different recovery strategies may be necessary. Since elevated or reduced helium quantities existing in the MPC cavity represent a potential overpressure or heat removal degradation concern, corrective actions should be developed and implemented in a timely manner. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.

(continued)

BASES

ACTIONS (continued)

C.1

If the helium leak rate limit has been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the impact of increased helium leak rate on heat removal. Since the HI-STAR OVERPACK is a sealed system, any leakage from the MPC is contained within the OVERPACK. Since an increased helium leak rate represents a potential challenge to MPC heat removal, reasonably rapid action is warranted. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

C.2

Once the cause and consequences of the elevated leak rate from the MPC are determined, a corrective action plan shall be developed and initiated to the extent necessary to return the MPC to an analyzed condition. Since the recovery mechanisms can range over a broad scale based on the evaluation performed under Required Action C.1, different recovery strategies may be necessary. Since an elevated helium leak rate represents a challenge to heat removal rates, reasonably rapid action is required. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.

D.1

If the MPC fuel cavity cannot be successfully returned to a safe, analyzed condition, the fuel must be placed in a safe condition in the spent fuel pool. The Completion Time is reasonable based on the time required to perform fuel cool-down operations, re-flood the MPC, install the lid retention device, cut the MPC lid welds, move the SFSC into the spent fuel pool, remove the lid retention device and the MPC lid, and remove the spent fuel assemblies in an orderly manner and without challenging personnel.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.1.1.1, SR 3.1.1.2, and SR 3.1.1.3

The long-term integrity of the stored fuel is dependent on storage in a dry, inert environment. Cavity dryness may be demonstrated either by evacuating the cavity to a very low absolute pressure and verifying that the pressure is held over a specified period of time or by recirculating dry helium through the MPC cavity to absorb moisture until the demoisturizer exit temperature reaches and remains below the acceptance limit for the specified time period. A low vacuum pressure or a demoisturizer exit temperature meeting the acceptance limit is an indication that the cavity is dry.

Having the proper helium backfill pressure ensures adequate heat transfer from the fuel to the fuel basket and surrounding structure of the MPC.

The leakage rate acceptance limit is specified in units of atm-cc/sec. This is a mass-like leakage rate as specified in ANSI N14.5 (1997). This is defined as the rate of change of the pressure-volume product of the leaking fluid at test conditions. This allows the leakage rate as measured by a mass spectrometer leak detector (MSLD) to be compared directly to the acceptance limit without the need for unit conversion from test conditions to standard, or reference conditions.

All three of these surveillances must be successfully performed once prior to TRANSPORT OPERATIONS to ensure that the conditions are established for storage, which preserve the analysis basis supporting the cask design.

REFERENCES

1. Humboldt Bay ISFSI SAR Sections 3.1
2. Humboldt Bay ISFSI SAR Section 4.2.3.3 and Table 4.5-1
3. Humboldt Bay ISFSI SAR Section 5.1.1.2 and Table 5.1-1
4. Humboldt Bay ISFSI SAR Sections 7.4 and Table 7.4-1
5. Humboldt Bay ISFSI SAR Sections 10.2.2.2, 10.2.2.3, and Figure 10.2-3.

B 3.1 SPENT FUEL STORAGE CASK (SFSC) INTEGRITY

B 3.1.2 OVERPACK Heat Removal System

BASES

BACKGROUND	The OVERPACK heat removal system is a passive heat transfer system that ensures heat from the MULTI-PURPOSE CANISTER (MPC) is transferred to the environs by conduction and radiation.
APPLICABLE SAFETY ANALYSIS	The thermal analyses of the SFSC take credit for the decay heat from the spent fuel assemblies being ultimately transferred to the ambient environment surrounding the OVERPACK. Transfer of heat away from the fuel assemblies ensures that the fuel cladding and other SFSC component temperatures do not exceed applicable limits.
LCO	The SFSC heat removal system must be verified to be operable to preserve the assumptions of the thermal analyses. The operability of the heat removal system ensures that the decay heat generated by the stored fuel assemblies is transferred to the environs at a sufficient rate to maintain fuel cladding and other SFSC component temperatures within design limits.
APPLICABILITY	The LCO is applicable during TRANSPORT and STORAGE OPERATIONS. Once a SFSC has been placed in storage, the heat removal system must be operable to ensure adequate heat transfer of the decay heat away from the fuel assemblies.
ACTIONS	A note has been added to the ACTIONS, which states that for this LCO, separate condition entry is allowed for each MPC-HB. This is acceptable since the Required Actions for each condition provide appropriate compensatory measures for each SFSC not meeting the LCO. Subsequent SFSCs that don't meet the LCO are governed by subsequent condition entry and application of associated Required Actions. <u>A.1</u> If the cavity pressure limit has been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the potential quantity of moisture left within the OVERPACK cavity. Since moisture remaining in the cavity during these modes of operation may represent a long-term degradation concern, immediate action is not necessary. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

(continued)

BASES

ACTIONS (continued)

A.2

Once the quantity of moisture potentially left in the OVERPACK cavity is determined, a corrective action plan shall be developed and actions initiated to the extent necessary to return the OVERPACK to an analyzed condition. Since the quantity of moisture estimated under Required Action A.1 can range over a broad scale, different recovery strategies may be necessary. Since moisture remaining in the cavity during these modes of operation may represent a long-term degradation concern, immediate action is not necessary. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.

B.1

If the helium backfill pressure limit has been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the quantity of helium within the OVERPACK cavity. Since too much or too little helium in the OVERPACK during these modes represents a potential overpressure or heat removal degradation concern, an engineering evaluation shall be performed in a timely manner. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

B.2

Once the quantity of helium in the OVERPACK cavity is determined, a corrective action plan shall be developed and initiated to the extent necessary to return the OVERPACK to an analyzed condition. Since the quantity of helium estimated under Required Action B.1 can range over a broad scale, different recovery strategies may be necessary. Since elevated or reduced helium quantities existing in the OVERPACK cavity represent a potential overpressure or heat removal degradation concern, corrective actions should be developed and implemented in a timely manner. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.

C.1

If the helium leak rate limit has been determined not to be met during TRANSPORT OPERATIONS or STORAGE OPERATIONS, an engineering evaluation is necessary to determine the impact of increased helium leak rate on the heat removal capability. The Completion Time is sufficient to complete the engineering evaluation commensurate with the safety significance of the CONDITION.

(continued)

BASES

ACTIONS (continued)	C.2 Once the cause and consequences of the elevated leak rate from the OVERPACK are determined, a corrective action plan shall be developed and initiated to the extent necessary to return the OVERPACK to an analyzed condition. Since the recovery mechanisms can range over a broad scale based on the evaluation performed under Required Action C.1, different recovery strategies may be necessary. Since an elevated helium leak rate represents a challenge to heat removal rates, reasonably rapid action is required. The Completion Time is sufficient to develop and initiate the corrective actions commensurate with the safety significance of the CONDITION.
SURVEILLANCE REQUIREMENTS	SR 3.1.2.1, SR 3.1.2.2, and SR 3.1.2.3 The long-term integrity of the stored fuel is dependent on storage in a dry, inert environment. Cavity dryness is demonstrated by maintaining cavity pressure below the acceptance limit for the specified time period. Having the proper helium backfill pressure ensures adequate heat transfer from the MPC to the OVERPACK. Meeting the helium leak rate limit ensures there is adequate helium in the OVERPACK for long term storage. The leakage rate acceptance limit is specified in units of atm-cc/sec. This is a mass-like leakage rate as specified in ANSI N14.5 (1997). This is defined as the rate of change of the pressure-volume product of the leaking fluid at test conditions. This allows the leakage rate as measured by a mass spectrometer leak detector (MSLD) to be compared directly to the acceptance limit without the need for unit conversion from test conditions to standard, or reference conditions. All three of these surveillances must be successfully performed once prior to TRANSPORT OPERATIONS to ensure that the conditions are established for storage, which preserve the analysis basis supporting the cask design.
REFERENCES	1. Humboldt Bay ISFSI SAR Section 3.4, Table 3.4-2 2. Humboldt Bay ISFSI SAR Section 4.4 3. Humboldt Bay ISFSI SAR Sections 7.1, 7.2, and 7.3 4. Humboldt Bay ISFSI SAR Section 8.1 5. Humboldt Bay ISFSI SAR Sections 8.2.11

B 3.1 SPENT FUEL STORAGE CASK (SFSC) INTEGRITY

B 3.1.3 Fuel Cool-Down

BASES

BACKGROUND	In the event that an MPC must be unloaded, the SFSC is returned to the cask preparation area to begin the process of fuel unloading. The MPC closure ring, and vent and drain port cover plates are removed. The MPC gas is sampled to determine the integrity of the spent fuel cladding. The MPC is attached to the Cool-Down System. The Cool-Down System is a closed-loop forced ventilation gas cooling system that cools the fuel assemblies by cooling the surrounding helium gas. Following fuel cool-down, the MPC is then re-flooded with water, the lid retention device is installed, and the MPC lid weld is removed leaving the MPC lid in place. The SFSC is placed in the spent fuel pool and the lid retention device is removed, followed by the MPC lid. The fuel assemblies are removed from the MPC and the MPC and HI-STAR HB OVERPACK are removed from the spent fuel pool and decontaminated. Reducing the fuel cladding temperatures significantly reduces the temperature gradients across the cladding, thus minimizing thermally-induced stresses on the cladding during MPC re-flooding. Reducing the MPC internal temperatures eliminates the risk of high MPC pressure due to sudden generation of steam during re-flooding.
APPLICABLE SAFETY ANALYSIS	The confinement of radioactivity during the storage of spent fuel in the MPC is ensured by the multiple confinement boundaries and systems. The barriers relied on are the fuel pellet matrix, the metallic fuel cladding tubes in which the fuel pellets are contained, and the MPC in which the fuel assemblies are stored. Long-term integrity of the fuel and cladding depend on minimizing thermally induced stresses to the cladding. This is accomplished during the unloading operations by lowering the MPC internal temperatures prior to MPC re-flooding. The integrity of the MPC depends on maintaining the internal cavity pressures within design limits. This is accomplished by reducing the MPC internal temperatures such that there is no sudden formation of steam during MPC re-flooding.

(continued)

BASES (continued)

LCO	Determining that the circulating MPC gas exit temperature is below the acceptance criteria ensures that there will be no large thermal gradient across the fuel assembly cladding during re-flooding which could be potentially harmful to the cladding. The temperature limit specified in the LCO was selected to ensure that the MPC gas exit temperature will closely match the desired fuel cladding temperature prior to re-flooding the MPC. The temperature was selected to be lower than the boiling temperature of water with an additional margin.
APPLICABILITY	The MPC helium bulk gas exit temperature is determined during UNLOADING OPERATIONS after the SFSC is back in the fuel building and is no longer suspended from, or secured in, the transporter. Therefore, the Fuel Cool-Down LCO does not apply during TRANSPORT OPERATIONS and STORAGE OPERATIONS. A note has been added to the APPLICABILITY for LCO 3.1.3 which states that the Applicability is only applicable during wet UNLOADING OPERATIONS. This is acceptable since the intent of the LCO is to avoid uncontrolled MPC pressurization due to water flashing during re-flooding operations. This is not a concern for dry UNLOADING OPERATIONS.
ACTIONS	A note has been added to the ACTIONS which states that, for this LCO, separate Condition entry is allowed for each MPC. This is acceptable since the Required Actions for each Condition provide appropriate compensatory measures for each MPC not meeting the LCO. Subsequent MPCs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. <u>A.1</u> If the MPC helium bulk gas exit temperature limit is not met, actions must be taken to restore the parameters to within the limits before re-flooding the MPC. Failure to successfully complete fuel cool-down could have several causes, such as failure of the cool down system, inadequate cool down, or clogging of the piping lines. The Completion Time is sufficient to determine and correct most failure mechanisms and proceeding with activities to flood the MPC cavity with water are prohibited.

(continued)

BASES

ACTIONS (continued)	A.2 If the LCO is not met, in addition to performing Required Action A.1 to restore the bulk gas temperature to within the limit, the proper conditions must exist for the transfer of heat from the MPC to the surrounding environs to ensure the fuel cladding remains below the short term temperature limit. Ensure the annulus between the MPC and the HI-STAR HB OVERPACK is filled with water. This places the system in a heat removal configuration which is bounded by the SAR thermal evaluation of the system considering a vacuum in the MPC. The system is open to the ambient environment which limits the temperature of the ultimate heat sink (the water in the annulus) and, therefore, the MPC shell to 212°F. Twenty-four (24) hours is an acceptable time frame to allow for completion of Required Action A.2 and is conservatively based on a thermal evaluation of a HI-STAR HB OVERPACK located in a vault. In such a configuration, passive cooling mechanisms will be largely diminished. Eliminating 90 percent of the passive cooling mechanisms with the cask emplaced in the vault, the thermal inertia of the cask (approximately 20,000 Btu/°F) will limit the rate of temperature rise with design basis maximum heat load to less than 4°F per hour. Thus, the fuel cladding temperature rise in 24 hours will be less than 100°F. Large short term temperature margins exist to preclude any cladding integrity concerns under this temperature rise.
SURVEILLANCE REQUIREMENTS	SR 3.1.3.1 The long-term integrity of the stored fuel is dependent on the material condition of the fuel assembly cladding. By minimizing thermally-induced stresses across the cladding, the integrity of the fuel assembly cladding is maintained. The integrity of the MPC is dependent on controlling the internal MPC pressure. By controlling the MPC internal temperature prior to re-flooding the MPC there is no formation of steam during MPC re-flooding. The MPC helium exit gas temperature limit ensures that there will be no large thermal gradients across the fuel assembly cladding during MPC re-flooding and no formation of steam which could potentially overpressurize the MPC. Fuel cool down must be performed successfully on each SFSC before the initiation of MPC re-flooding operations to ensure that the design and analysis basis are preserved.

BASES (continued)

REFERENCES	1.	Humboldt Bay ISFSI SAR Sections 4.2.3.3.5, 4.4.1, and 4.4.1.2.6
	2.	Humboldt Bay ISFSI SAR Table 5.1-1
	3.	Humboldt Bay ISFSI SAR Sections 9.4.1.1.2 and 9.4.1.1.4
	4.	Humboldt Bay ISFSI SAR Sections 10.2.3 and 10.2.3.1