

TECHNICAL SPECIFICATION BASES
for the
FORT ST. VRAIN
INDEPENDENT SPENT FUEL STORAGE INSTALLATION
Revision 1

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B 2.0 FUNCTIONAL AND OPERATING LIMITS

B 2.1.1 Spent Fuel Elements Stored at ISFSI

BASES

BACKGROUND 10 CFR 72.44(c) requires specifications which provide limits on fuel or waste handling and storage conditions found to be necessary to protect the integrity of the stored fuel or waste container, to protect employees against occupational exposures and to guard against the uncontrolled release of radioactive materials.

These limitations are included in the thermal, structural, radiological, and criticality evaluations performed for the MVDS design.

APPLICABLE SAFETY ANALYSIS The design criteria and subsequent safety analysis of the MVDS assumed certain characteristics and limitations for the spent fuel elements that are stored. Specification 2.1.1 assures that these assumptions remain valid by preventing additional spent fuel from being introduced into the MVDS. ISFSI SAR Section 3.1.1 identifies the irradiation history and maximum thermal heat generation for the fuel, which are the design bases for the MVDS.

FUNCTIONAL AND OPERATING LIMITS VIOLATIONS The following Functional and Operating Limits violation responses are applicable.

2.2.1

If Functional and Operating Limit 2.1.1 is violated, the limitations on the spent fuel elements in the MVDS have not been met. Actions must be taken to place the affected fuel elements in a safe condition. It is acceptable for the affected fuel elements to remain in the MVDS if that is determined to be a safe condition.

2.2.2 & 2.2.3

Notification of the violation of a Functional and Operating Limit to the NRC is required within 24 hours. Written reporting of the violation must be accomplished within 30 days. This notification and written report are independent of any notification and report required by 10 CFR 72.75.

REFERENCES 1. Safety Analysis Report, Section 3.1.1, Spent Fuel to be Stored.

B 3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

BASES

LCOs LCO 3.0.1, 3.0.2, 3.0.4, and 3.0.5 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 item is in the specified conditions of the Applicability statement of each Specification).

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

- 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 stated.

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 which permit continued operation which 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.

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LCO 3.0.2
(continued)

The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally when the item is in the specified conditions of the Applicability Statement. 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.

LCO 3.0.3

This specification is not applicable to an ISFSI. 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 item 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 the facility being required to exit the Applicability desired to be entered to comply with the required Actions.

Compliance with the Required Actions which permit continued operation of the facility for an unlimited period 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.

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LCO 3.0.4
(continued)

The provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability related to the unloading of an FSC or lowering of the CHM.

Exceptions to LCO 3.0.4 may be 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

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or determined to not meet the LCO to comply with ACTIONS. The sole purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not with the applicable Required Action(s) to allow the performance of SRs to demonstrate:

- a. The equipment being returned to service meets the LCO; or
- b. Other equipment meets the applicable LCOs.

The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the allowed testing. This Specification does not provide time to perform any other preventive or corrective maintenance.

LCO 3.0.6

This specification is not applicable to an ISFSI. The placeholder is retained for consistency with the power reactor technical specifications.

LCO 3.0.7

This specification is not applicable to an ISFSI. 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 3.0.4 establishes 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 Surveillances are performed to verify the systems, components, and variables are within specified limits. Failure to meet 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 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 not to be 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 determined to not meet the LCO because the ACTIONS define the applicable remedial measures. Surveillances have to be met and performed in accordance with SR 3.0.2 before 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

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SR 3.0.1 incapable of performing its function. This will allow
(continued) operation to proceed to a specified condition where other
 necessary post maintenance tests can be completed.

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 which 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 plant operating conditions not 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 resulting from 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 the 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 which 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% single extension to this Completion Time is that such an action usually verified 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.

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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 time it is discovered the Surveillance has not been performed in accordance with SR 3.0.2, and not at the time the specified Frequency was not met.

This delay period provides adequate time to complete Surveillances which have been missed. This delay period permits the completion of a Surveillance before complying with Required Actions or other remedial measures which 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 results 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 or operational situations, 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 applicable as a consequence of changes in the specified conditions in the Applicability imposed by 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 completed 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.

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SR 3.0.3 Completion of the Surveillance within the delay period
 (continued) allowed by the Specification, or within the Completion Time
 of the ACTIONS, restores compliance with SR 3.0.1.

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, component, device, or variable is outside its 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 such equipment. 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, failure 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 which 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 required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability related to the unloading of an FSC.

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions 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

(continued)

SR 3.0.4
(continued)

LCO before the performance or completion of a Surveillance.
A Surveillance which 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.

B 3.1 MVDS COOLING SYSTEM

B 3.1.1 MVDS Cooling Inlet and Outlet

BASES

BACKGROUND

The FSCs are vertically located and supported at their lower ends on the MVDS floor and supported at their upper ends by the charge face structure. The fuel in the FSCs is cooled by a passive self-regulating cooling system that induces buoyancy driven ambient air to flow across the exterior of the FSCs.

The flow of air through the MVDS is once-through: outside air enters the vault module through a mesh covered opening to prevent the ingress of birds, animals, large debris, etc. The labyrinth arrangement of the inlet structure provides radiological shielding for the stored fuel. Cooling air distribution across the outside of the banks of sealed FSCs is improved by precast concrete collimators set into pockets in the vault module structure air inlet walls. The collimators also provide a contribution to the radiological shielding of the stored fuel. The cooling air leaves the vault module through a second set of concrete collimators, which serve the same functions as those at the inlet, and is exhausted to atmosphere through a concrete cooling air outlet chimney that extends above the charge face.

Ensuring the cooling inlet and outlet screens are mostly free from blockage allows sufficient flow of cooling air across the exterior of the FSCs to remove the decay heat from the spent fuel.

APPLICABLE
SAFETY ANALYSIS

The confinement of radioactivity during the storage of spent fuel and the safe handling of fuel removed from storage is ensured by the use of multiple confinement barriers. The fuel matrix and the fuel particle coating comprise one of these barriers. Long-term stability of the fuel during storage in air is ensured by maintaining the heat removal capability of the MVDS. This is accomplished by maintaining most of the area of the cooling air inlets and outlets free from obstructions. The failure to prevent sustained, full or partial blockage of the cooling inlets and outlets is considered in the offnormal operations analysis and the accident analysis (Ref. 1 and Ref. 2, respectively).

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B 3.1.1 MVDS Cooling Inlet and Outlet (continued)

LCO Cooling inlet and outlet screens with most of the area free from blockage indicates that the MVDS decay heat removal capability is maintained. Removing decay heat from the MVDS ensures the fuel temperature remains sufficiently low to minimize oxidation of the fuel matrix.

APPLICABILITY Maintaining sufficient opening of the cooling inlet and outlet screens is required whenever spent fuel is stored in the MVDS. Therefore, the requirements do not apply after all the spent fuel has been removed from the MVDS.

ACTIONS A.1

Clearing blockage as soon as practical recognizes that the system design and the relatively low decay heat sources of the spent fuel does not mandate response actions be taken when conditions (e.g., daylight or weather conditions) could present unwarranted personnel hazards.

B.1

Clearing the blockage within 24 hours is required when blockage of inlet or outlet flow areas equals or exceeds 95 percent because the blockage may have existed since the most recent surveillance (up to 9 days earlier).

SURVEILLANCE REQUIREMENTS SR 3.1.1.1

The long-term integrity of the spent fuel stored in air is dependent upon maintaining temperatures within the design basis limits. Sufficiently clear cooling inlet and outlet flow areas are indications that the spent fuel temperatures are below limits.

Performance of this surveillance every 7 days is sufficient because the design basis temperatures for fuel or structural concrete are not reached for over 9 days with 100% blockage and because the fuel has decayed significantly beyond the levels used in the analysis.

REFERENCES

1. SAR Section 8.1.2, Full or Partial Blockage of Air Inlet to Vault Module
2. SAR Section 8.2.8, Full or Partial Blockage of Outlet to Vault Module

B 3.2 CONTAINER HANDLING MACHINE

B 3.2.1 Container Handling Machine Operability

BASES

BACKGROUND The CHM provides the means for raising or lowering the FSCs from or into the transportation cask in the cask load/unload port and raising or lowering the FSC at the MVDS charge face. When contained within the CHM, the FSC is fully shielded and the fuel decay heat is dissipated via machine exterior surfaces. A specially designed attachment grapple is used to lift the FSC. The CHM is moved through the MVDS by the MVDS crane.

The CHM consists of four major components: (1) the machine base including an isolation valve and four shock absorber legs, (2) the machine body which is shielded to provide radiation protection, (3) the raise/lower mechanism, and (4) the CHM control and power supply.

APPLICABLE The confinement of radioactivity during the handling of
SAFETY ANALYSIS spent fuel is ensured by designs and controls to prevent damage to spent fuel due to handling accidents.

The raise/lower mechanism of the CHM comprises a portion of the load path when raising an FSC. The mechanical components of the raise/lower mechanism were designed with an adequate factor of safety and are inspected before and periodically during fuel handling. The design and inspections provide assurance that the raise/lower mechanism do not cause a fuel drop accident within the MVDS.

The MVDS isolation valves (those used to isolate FSC positions on the charge face structure or the cask load/unload port) and the CHM isolation valve are designed to provide interlocks which prevent the CHM isolation valve from being closed onto a partially inserted FSC or from allowing the CHM to be lifted from a MVDS isolation valve while still open. Inspections before and periodically during fuel handling provide assurance that spent fuel will not be dropped from the CHM.

The failure of these controls is considered in the accident analysis (Refs. 1, 2, 3, and 4).

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B 3.2.1 Container Handling Machine Operability (continued)

LCO CHM operability is required to ensure proper handling of fuel storage containers. Annual functional tests of the isolation valves and protective control interlocks provide conservative assurance that the CHM performs during use as designed. The MVDS crane lifting height dead stop device provides assurance that the CHM cannot be lifted greater than 4 inches, as discussed in the basis for Technical Specification 3.2.2.

APPLICABILITY The operability and integrity surveillances are performed before commencing fuel handling operations and periodically during fuel handling operations. These surveillances are only required during storage operations when FSCs containing spent fuel are being moved.

ACTIONS A.1

The inspections and functional tests are performed without spent fuel in the CHM. However, this ACTION could be applicable if CHM component failure is detected while fuel is being handled. The nearest safe storage location could be within an open storage position on the charge face, FSC storage well, within a transport cask, or within the CHM. The selection of nearest safe storage position may consider factors such as the time required to relocate one or both MVDS isolation valves, whether the spent fuel needs to be removed from the CHM to effect repairs, etc.

SURVEILLANCE REQUIREMENTS SR 3.2.1.1

Maintaining operability and integrity of the CHM raise/lower mechanism mechanical components ensures spent fuel will not be damaged during fuel handling.

SR 3.2.1.2

Maintaining operability and integrity of the interlocks associated with the MVDS isolation valves and the CHM isolation valve ensures spent fuel will not be damaged during fuel handling.

(continued)

B 3.2.1 Container Handling Machine Operability (continued)

- REFERENCES
1. SAR Section 8.2.11, Lifting of Equipment Out of Sequence
 2. SAR Section 8.2.12, Close Isolation Valve onto Partially Inserted Fuel Storage Container or Fuel Element
 3. SAR Section 8.2.13, Deposit Fuel Storage Container/Fuel Element on the Charge Face
 4. SAR Section 8.2.14, Traverse Container Handling Machine with Load Partially Inserted
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B 3.2 CONTAINER HANDLING MACHINE

B 3.2.2 CHM Lifting Height

BASES

BACKGROUND The MVDS crane operates over the MVDS charge face and CLUP and provides all lifting operations necessary to support fuel handling. When lifting the CHM, the crane hook couples to the lifting frame of the CHM.

The crane is rated at 110,000 pounds capacity, pendant controlled, electric overhead traveling goliath type. It is supported on rails from the MVDS charge hall concrete walls at the +34 ft. level, traverses the length of the building, and spans the charge face.

The gantry and trolley are designed to remain on their respective runways with their wheels prevented from leaving the tracks during a seismic event or tornado.

The crane structure and upper limit of the hoist controls the potential drop height of the CHM. These limits and restraints ensure that no release of radioactivity will occur in the event of any of the items carried by the crane being dropped.

APPLICABLE The confinement of radioactivity during the handling of
SAFETY ANALYSIS spent fuel is ensured by designs and controls to prevent damage to spent fuel due to handling accidents.

The MVDS crane operates over the MVDS charge face and provides lifting for all operations. The MVDS crane structure and upper limit on hoist travel will control the potential drop height of the CHM onto the charge face structure. The MVDS crane is conservatively and seismically designed to retain and control the load during the seismic event. The gantry and trolley are designed to remain in place on their respective runways with their wheels prevented from leaving the tracks during a seismic or tornado event. Failure of the MVDS crane and subsequent dropping of the transfer cask, the handling machine or the isolation valves will not result in the release of radioactivity, and the load handled by the MVDS crane is not designated as critical.

(continued)

B 3.2.2 CHM Lifting Height (continued)

APPLICABLE
SAFETY ANALYSIS
(continued)

Failure of the MVDS crane while handling the CHM or other components does not result in a drop on to the charge face of greater than 4". The CHM is restrained from toppling by secondary restraints which are attached to the crane structure from the CHM top plate. The 4" drop is the maximum clearance between the charge face/shield plugs and the CHM support legs.

Design calculations for the 4" drop of the FSCs are included in the ISFSI SAR for the postulated case of a FSC being dropped within the grapple release band on to a support stool, and the FSC remains readily retrievable. This postulated drop is considerably less than the 22 feet drop addressed for the FSC from the upper datum on to the vault floor for which calculations and compression testing demonstrate that the FSC will not rupture and remains recoverable.

The raise/lower mechanism provides a high integrity means by which the FSC can be raised into or lowered from the machine using a grapple. The mechanism and grapple are designed to be single failure proof. Thus, failure of any single component will not result in the dropping of a FSC.

In the unlikely event of failure of the MVDS crane hoist system while supporting the machine, the drop height onto the charge face structure is limited to minimize the risk of damage to the structure, fuel stored in the vault modules, and fuel that is contained in the CHM. The failure of these features is considered in the accident analysis (Refs. 1, 2, and 3).

LCO

The CHM lifting height is operationally limited by redundant hoist travel limit switches. The redundant limit switches are backed up by a dead stop device which, if challenged, would activate the hoist overload cutoff. Failure of these limit switches would neither result in the lift height limit being exceeded nor result in a drop accident. Ensuring the LCO is met ensures that the consequences of a drop accident would not result in an unsafe condition.

APPLICABILITY

The consequences of a drop accident are controlled to prevent damage to an FSC contained in a CHM and to prevent damage to the charge face structure while FSCs containing spent fuel are stored in the MVDS.

(continued)

B 3.2.2 CHM Lifting Height (continued)

ACTIONS

A.1

If the lift height of the CHM exceeds 3.5", then the normal lift height controls (the limit switches) have not been effective.

Lowering the CHM to the floor until the hoist travel limit switches and the dead stop device are operable ensures the consequences of an unlikely drop accident will not exceed the safety analysis.

SURVEILLANCE
REQUIREMENTS

SR 3.2.2.1

Maintaining the integrity of the dead stop device provides the ultimate assurance that the lift height limit is not exceeded.

SR 3.2.2.2

Maintaining the operability of the hoist travel limit switches provides assurance that each lift is performed at the operational setpoint and minimizes the challenges to the dead stop device.

REFERENCES

1. SAR Section 8.1.11, Drop Container Handling Machine from MVDS Crane
 2. SAR Section 8.2.3, Dropping a Fuel Storage Container
 3. SAR Section 8.2.6, Impacts on Charge Face Structure
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B 3.3 FUEL STORAGE CONTAINER

B 3.3.1 Seal Leak Rate

BASES

BACKGROUND

The FSC is the secondary confinement barrier for FSV spent fuel. Each FSC will accommodate 6 FSV fuel elements.

Each FSC consists of the following parts: a top flange, a base forging, a 186 inch long by 0.5 inch thick tube; an external bottom location pin; 3 internal fuel orientation pins; a top lid with machined grooves and 2 metal O-ring seals; and 24 bolts (for securing the top flange to the top lid).

The FSC is restrained radially by a bottom location pin which fits into the FSC support stool which, in turn, is anchored to the vault floor. The stool also supports the vertical load of the FSC. The top of the FSC is restrained radially by the charge face structure.

APPLICABLE
SAFETY ANALYSIS

The confinement of radioactivity during the storage of spent fuel is ensured by the use of multiple confinement barriers. The FSC is designed to provide the secondary confinement (with the fuel particle coatings providing the primary confinement). Double metal O-ring seals between the FSC lid and top flange provide a high integrity and leak checkable sealing arrangement designed to withstand exposure to radiation during the storage period without the need for maintenance. A sealable O-ring interspace tapping allows container sealing to be confirmed before fuel transfer to the MVDS and for confirmatory checks during the storage period. The complete failure of one FSC, which bounds the failure of the O-ring seals, is considered in the accident analysis (Ref. 1).

(continued)

B 3.3.1 Seal Leak Rate (continued)

LCO Each FSC is a high integrity carbon steel canister whose top closure includes double metal O-ring seals. These seals ensure FSC integrity under all storage environments, although there is no credible source of pressure within or external to the FSCs during storage.

APPLICABILITY Performing the seal leak rate checks periodically throughout the storage period minimizes the chances of an undetected release of radioactive materials from the MVDS.

ACTIONS A.1.1 & A.1.2.1

The action to restore the first two unacceptable seals (discovered during any single surveillance) to an acceptable condition within 7 days allows for an orderly repeat of the leak rate check, or replacement or repair of the seals or sealing surfaces, while minimizing the amount of time that the defective condition is allowed to exist. The completion time also provides a reasonable time to ensure the FSCs being handled do not have a flammable gas concentration.

In the event that integrity cannot be restored in the defective FSC, 7 days are allowed for an orderly transfer of the FSC to a storage well or transfer to an approved shipping container. This minimizes the time that the degraded condition may exist while allowing adequate time to prepare the facility and personnel for the transfer the FSC.

Nothing in the license precludes the transfer of an FSC to an approved shipping container. Such a configuration is recognized to be safe but not intended for interim storage. Such a configuration also removes the FSC from the Applicability of the ACTION table for this LCO. If an FSC is transferred to an approved shipping container, actions should continue to either return the FSC to approved storage in the MVDS or to take the FSC to another facility, such as the INL.

A.1.2.2

After transfer to a storage well, a leak test is required of the storage well. The successful leak test of the storage well is included in the 7 day completion time.

(continued)

B 3.3.1 Seal Leak Rate (continued)

ACTIONS
(continued)

A.2 & A.3

Upon failure of one or two of the 6 FSC top closures used for the trending of top closure performance, an additional 12 FSC top closures (2 from each vault) must be tested to evaluate whether the problem is isolated to the single failure or indicates a more extensive problem.

The data from the additional FSC top closure tests will be reviewed and an engineering evaluation prepared of all failed seals. This engineering evaluation will address the cause and identify corrective actions.

The report to NRC may identify new license requirements or commitments. Adequate time is provided for each ACTION to ensure adequacy of the evaluation.

B.1

Performance of the REQUIRED ACTIONS specified for CONDITION A for each unacceptable top seal within the specified COMPLETION TIMES would not be practical if more than one or two unacceptable top closures are detected within a short period. Upon detection of more than two unacceptable FSC or storage well top closures during a single surveillance, the prompt notification of NRC is required to ensure a closer level of oversight of the evaluation and corrective action.

SURVEILLANCE
REQUIREMENTS

SR 3.3.1.1

Performance of a 5-year leak test of at least 6 FSC closures provides reasonable assurance of continued FSC integrity. Performance of each leak test on the same FSC closures provides data for trending. Because the Surveillance interval is 5 years, allowance of a 25% extension of this surveillance interval is not justified.

REFERENCES

1. SAR Section 8.2.15, Maximum Credible Accident
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B 3.3 FUEL STORAGE CONTAINER

B 3.3.2 FSC Low Temperature Limit

BASES

BACKGROUND The FSC is the secondary confinement barrier for FSV spent fuel. Each FSC will accommodate 6 FSV fuel elements.

Each FSC consists of the following parts: a top flange, a base forging, a 186 inch long by 0.5 inch thick tube; an external bottom location pin; 3 internal fuel orientation pins; a top lid with machined grooves and 2 metal O-ring seals; and 24 bolts (for securing the top flange to the top lid). The FSCs were fabricated of carbon steel.

APPLICABLE MVDS thermal parameters have been evaluated at two selected
SAFETY ANALYSIS ambient temperatures to demonstrate the thermal performance over the extreme temperature range. The lowest ambient temperature considered was -32 degrees F (-36 degrees C). This was used to evaluate performance under extremely low ambient temperature conditions.

The design of the lifting equipment in the MVDS minimizes the probability of a drop accident involving an FSC. Further, design calculations for a 4" drop of an FSC are included in the ISFSI SAR for the postulated case of a FSC being dropped within the grapple release band on to a support stool, and the FSC remains readily retrievable. This postulated drop is considerably less than the 22 feet drop addressed for the FSC from the upper datum on to the vault floor for which calculations and compression testing demonstrate that the FSC will not rupture and remains recoverable.

However, material testing of the carbon steel material of the same type used in the fabrication of the FSCs indicates that this material can behave in a brittle manner at temperatures below 12 degrees F.

LCO Limiting the ambient air temperature to 12 degrees F before commencing FSC handling prevents drop accidents at times when the carbon steel of an FSC could behave in a brittle manner.

(continued)

B 3.3.2 FSC Low Temperature Limit (continued)

APPLICABILITY Applying this limitation whenever handling spent fuel ensures that an FSC containing spent fuel will not be subject to brittle failure during a drop accident.

ACTIONS

A.1

Placing an FSC being handled in a safe condition needs to consider the ambient temperature around the FSC and the ambient temperatures of possible FSC locations. If the FSC has been placed into the CHM, the space above the charge face is generally heated during the winter for operator comfort. This heated temperature space can permit the continued handling of the FSC until the point is reached where lower temperature (outside air, for example) conditions will be encountered.

In the event an FSC is suspended above the support stool, a STORAGE WELL, or transfer cask but not yet in the warmer air of the CHM, it shall be lowered until it is again supported.

A.2

Most often, the existence of low temperatures will be detected before commencing FSC handling. In the case where additional handling of the FSC is allowed according to the limits of REQUIRED ACTION A.1, no handling is permitted of any other FSC until ambient temperatures have recovered sufficiently to ensure the FSCs have warmed.

SURVEILLANCE
REQUIREMENTS

SR 3.3.2.1

To protect against the possibility of cold outside air temperatures during the previous 8 hours creating an unsafe condition, it is expected that the lowest temperature of the previous 8 hours will be determined from commonly available weather data. Because of the low remaining decay heat in the spent fuel, no credit is allowed for heating the FSCs from within.

Because of the slow pace of fuel handling operations, it is not unreasonable to require a recheck of the ambient air temperature immediately prior to commencing each movement of spent fuel into or out of the CHM. During the movement into or out of the CHM, the outside air temperature must be taken into consideration.

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B 3.3.2 FSC Low Temperature Limit (continued)

- REFERENCES
1. SAR Section 8.2.3, Dropping a Fuel Storage Container
 2. SAR Section 8.2.15, Maximum Credible Accident
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