TECHNICAL SPECIFICATION

FOR THE FuelSolutions™ STORAGE SYSTEM

to be used concurrent with

one of the canister Technical Specifications

Amendment 4

Page

LIST OF TABLES

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.
CANISTER	The CANISTER is the storage container for SFAs approved for use at the ISFSI.
INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)	The facility within the perimeter fence licensed for storage of spent fuel within CANISTERs.
INTACT FUEL	Fuel assemblies with no known or suspected cladding defects greater than hairline cracks or pinhole leaks.
LOADING OPERATIONS	LOADING OPERATIONS include all licensed activities on a CANISTER while it is being loaded with fuel assemblies. LOADING OPERATIONS begin when the first fuel assembly is placed in the CANISTER and end when the CANISTER outer closure plate to shell weld examination is complete.
SPENT FUEL ASSEMBLIES (SFAs)	Irradiated nuclear fuel assemblies that are to be placed in a CANISTER for dry storage.
SPENT FUEL STORAGE SYSTEM (SFSS)	The storage components including the CANISTER, STORAGE CASK, and TRANSFER CASK.
STORAGE CASK	The cask that provides a shielded, ventilated storage environment for the loaded CANISTER. This cask is used for TRANSFER OPERATIONS.
STORAGE OPERATIONS	STORAGE OPERATIONS include all licensed activities that are performed at the ISFSI while a CANISTER containing spent fuel is sitting inside a STORAGE CASK on a storage pad within the ISFSI.

1.1 Definitions

Term	Definition
TRANSFER CASK	The cask that is used for SFA LOADING OPERATIONS and UNLOADING OPERATIONS, and for TRANSFER OPERATIONS.
TRANSFER OPERATIONS	TRANSFER OPERATIONS include all licensed activities that are performed on a CANISTER loaded with one or more fuel assemblies when it is being moved to and from the ISFSI. For movement to the ISFSI, TRANSFER OPERATIONS begin when the CANISTER outer closure plate to shell weld inspection is complete and end when the CANISTER is in the STORAGE CASK in its storage position on the storage pad within the ISFSI. For movement from the ISFSI, TRANSFER OPERATIONS begin when the STORAGE CASK is moved and end when the CANISTER is moved into a transportation cask or the spent fuel building.
UNLOADING OPERATIONS	UNLOADING OPERATIONS include all licensed activities on a CANISTER to be unloaded of the contained fuel assemblies. UNLOADING OPERATIONS begin when the CANISTER is ready to initiate removal of the CANISTER outer closure plate and end when the last fuel assembly is removed from the CANISTER.

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 Require 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 indentations 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.

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 facility 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 facility 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 <u>not</u> 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.

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 completing 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.

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	Perform Action B.1.	12 hours
		AND		
		B.2	Perform Action B.2.	36 hours

When it is determined that a system does not 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, Condition A and B are exited, and therefore, the Required Actions of Condition B may be terminated.

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 Perform Action B.1. AND B.2 Perform Action B.2.	12 hours 36 hours

The Note above the ACTIONS Table is a method of modifying the Completion Time tracking. If this method of modifying the Completion Time tracking were only applicable 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 does not meet the LCO, Condition A is entered and its Completion Time starts. If it is determined that subsequent components do 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, as well as certain Notes in the Surveillance column that modify performance requirements. 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. The use of "met" or "performed" in these instances conveys specific meaning. A Surveillance is "met" only when the acceptance criteria are satisfied. Known failure of the requirements of a Surveillance, even without a Surveillance specifically being "performed," constitutes a Surveillance not "met."

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 it is determined the equipment does not meet the LCO, a variable is outside specified limits, or the unit is outside the Applicability of the LCO). If the interval specified by SR 3.0.2 is exceeded while the cask 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 unit 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.

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" indicates that both Frequency requirements must be met. Each time the example activity is to be performed, the Surveillance must be performed 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% extension allowed by SR 3.0.2.

"Thereafter" indicates 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 canceled or not performed, the measurement of both intervals stops. New intervals start upon preparing to restart the specified activity.

2.0 FUNCTIONAL AND OPERATING LIMITS

See each individual CANISTER Technical Specification for the applicable functional and operating limits.

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, except as provided in LCO 3.0.5. 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 to an SFSS.
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 a CANISTER. Exceptions to this Specification are stated in the individual Specifications. These exceptions allow entry into specified conditions in the Applicability when the associated ACTIONS to be entered allow operation in the specified condition in the Applicability only for a limited period of time.
LCO 3.0.5	Equipment removed from service or not in service in compliance with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate it meets the LCO or that other equipment meets the LCO. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing.
LCO 3.0.6	Not applicable to an SFSS.
LCO 3.0.7	Not applicable to an SFSS.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1	SRs shall be met during the 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 a 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 LCO's 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 a CANISTER.

3.1 CANISTER INTEGRITY

3.1.1 Canister Helium Backfill Density

See each individual CANISTER Technical Specification for the applicable LCO.

3.1 CANISTER INTEGRITY

3.1.2 Canister Vacuum Drying Pressure

LCO 3.1.2	The CANISTER cavity vacuum pressure following drying shall be #3 torr, maintained for at least 30 minutes.
APPLICABILITY:	During LOADING OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each CANISTER.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER cavity vacuum pressure limit not met.	A.1 Establish CANISTER cavity vacuum pressure within the limit in accordance with the vacuum drying program.	7 days.
B. Required Action and Associated Completion Time not met.	B.1 Remove all fuel assemblies from the CANISTER.	30 days.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.2.1	Verify that the CANISTER cavity vacuum pressure following drying is within the limit.	Prior to continuing LOADING OPERATIONS.

3.1 CANISTER INTEGRITY

3.1.3 Canister Leak Rate

LCO 3.1.3	The CANISTER leak rate for the inner closure plate to CANISTER shell weld, and the inner closure plate to drain and vent port body welds shall not exceed 8.52×10^{-6} ref-cc/sec.
APPLICABILITY:	During LOADING OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each CANISTER.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER leak rate limit is not met.	A.1 Establish CANISTER leak rate within limit.	96 hours.
B. Required Action and associated Completion Time are not met.	B.1 Remove all fuel assemblies from CANISTER.	30 days.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.3.1	Verify CANISTER leak rate is within limit.	Within 48 hours after verifying CANISTER vacuum pressure during drying within limit per LCO 3.1.2.

3.1 CANISTER INTEGRITY

3.1.4 Hydraulic Ram Force During Horizontal Canister Transfer

LCO 3.1.4	The ram force on the CANISTER during horizontal transfer shall not exceed 70,000 pounds pushing or 50,000 pounds pulling.
APPLICABILITY:	During TRANSFER OPERATIONS

ACTIONS

NOTE

Separate Condition entry is allowed for each CANISTER.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Hydraulic ram force limit on CANISTER is not met.	A.1 Initiate action to stop horizontal transfer. AND	Immediately.
	A.2 Move CANISTER back to cask from which it was being transferred. AND	7 days.
	A.3 Check STORAGE CASK rails for proper installation and damage. AND	Prior to proceeding with TRANSFER OPERATIONS.
	A.4 Verify alignment.	Prior to proceeding with TRANSFER OPERATIONS.

3.1.4 Hydraulic Ram Force During Horizontal Canister Transfer

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.4.1	Verify hydraulic ram force on CANISTER is within limit.	Continuously during horizontal TRANSFER OPERATIONS when transferring CANISTER between TRANSFER CASK and STORAGE CASK.

3.1 CANISTER INTEGRITY

3.1.5 Canister Vertical Time Limit in Transfer Cask

See each individual CANISTER Technical Specification for the applicable LCO.

3.2 CANISTER RADIATION PROTECTION

3.2.1 Canister Surface Contamination

LCO 3.2.1	The non-fixed (removable) radioactive contamination for the accessible external surfaces of a CANISTER shall not exceed: a. 1,000 dpm/100 cm^2 for beta-gamma sources. b. 20 dpm/100 cm^2 for alpha sources.
APPLICABILITY:	During LOADING OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each CANISTER.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Surface contamination limits are not met.	A.1 Establish CANISTER surface contamination within limit.	7 days.
B. Required Action and associated Completion Time are not met.	B.1 Determine the cause for the failure to meet Condition A, initiate actions to correct the cause, and establish the accessible CANISTER surface contamination within limit.	Prior to TRANSFER OPERATIONS.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.2.1.1	Verify that the removable contamination on the accessible exterior surface of the CANISTER containing fuel assemblies is within limits.	Within 4 hours before TRANSFER OPERATIONS.

(Deleted) |
3.3.1

3.3 STORAGE CASK INTEGRITY

3.3.1 (Deleted) |

|

3.3 STORAGE CASK INTEGRITY

3.3.2 Storage Cask Periodic Monitoring

See each individual CANISTER Technical Specification for the applicable LCO.

3.3 STORAGE CASK INTEGRITY

3.3.3 Storage Cask Temperatures During Horizontal Transfer

See each individual CANISTER Technical Specification for the applicable LCO.

3.4 TRANSFER CASK INTEGRITY

3.4.1 Transfer Cask Structural Shell Temperature

LCO 3.4.1 The temperature of the TRANSFER CASK, as detected by a permanently installed thermocouple mounted on the TRANSFER CASK structural shell (inside the neutron shield), shall remain above 40°F (4°C) when the ambient air temperature is below 32°F (0EC).

APPLICABILITY: During TRANSFER OPERATIONS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. TRANSFER CASK temperature limit is not met.	A.1 Establish TRANSFER CASK temperature within the limit.	2 hours.
B. Required Action and associated Completion Time are not met.	B.1 Move TRANSFER CASK to plant's fuel building or other heated area.	4 hours.
	AND	
	B.2 If CANISTER loaded with fuel is in TRANSFER CASK, fill annulus with water.	24 hours.
	AND	
	B.3 Inspect TRANSFER CASK liquid neutron shield and expansion tank for damage.	24 hours.
	AND	
	B.4 If TRANSFER CASK is damaged, repair as required.	7 days.

3.4.1 Transfer Cask Structural Shell Temperature

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	Verify TRANSFER CASK structural shell temperature within the limit.	Once after the TRANSFER CASK with a CANISTER containing fuel assemblies has been downended on the horizontal transfer skid and moved outside the plant's fuel building, or a loaded CANISTER has been retrieved from a STORAGE CASK or transportation cask. AND Every 1 hour thereafter during TRANSFER OPERATIONS.

3.5 TRANSFER CASK RADIATION PROTECTION

3.5.1 Transfer Cask Surface Contamination

LCO 3.5.1 The non-fixed (removable) radioactive contamination for the accessible surfaces of a TRANSFER CASK when the TRANSFER CASK is outside the plant's fuel building for horizontal TRANSFER OPERATIONS shall not exceed:

a. 1,000 dpm/100 cm^2 for beta-gamma sources

b. 20 dpm/100 cm^2 for alpha sources

APPLICABILITY: During TRANSFER OPERATIONS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Surface contamination limits are not met.	A.1 Establish TRANSFER CASK surface contamination within limit.	7 days.
B. Required Action and associated Completion Time are not met.	B.1 Determine the cause for the failure to meet Condition A, initiate actions to correct the cause, and establish the TRANSFER CASK surface contamination within limit.	Prior to TRANSFER OPERATIONS.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.1.1	Verify that the removable contamination on the accessible surfaces of the TRANSFER CASK is within limits.	Prior to moving the TRANSFER CASK outside the fuel building during horizontal TRANSFER OPERATIONS.

4.0 DESIGN FEATURES

The specifications in this section include the design characteristics of special importance to each of the physical barriers and the maintenance of safety margins in the storage system component design. The principal objective of this category is to describe the design envelope which might constrain any physical changes to essential equipment. Included in this category are the site environmental parameters which provide the bases for design, but are not inherently suited for description as LCOs.

4.1 Storage System

4.1.1 Storage Cask

4.1.1.1 Structural Performance

The STORAGE CASK has been evaluated for a tip-over during handling (equivalent to a side drop of 28 *g*) and a bottom end drop resulting in an axial gravitational (*g*) loading of 89 *g*.

The STORAGE CASK factors of safety due to Design Basis Earthquake (DBE) and all associated load combinations have been evaluated for all possible modes of failure. The DBE peak accelerations are defined as 0.25 *g* in two orthogonal horizontal directions and 0.25 *g* in the vertical direction.

4.1.1.2 Codes and Standards

The FuelSolutions™ W150 STORAGE CASK is designed in accordance with ACI 349 and fabricated in accordance with ACI 318. Exceptions to these codes are listed in Table 4.1-1.

4.1.1.3 Fabrication Exceptions to Codes, Standards, and Criteria

Proposed alternatives to ACI 318, including exceptions allowed by Section 4.1.1.2, may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or Designee. The applicant should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of ACI 318, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for exception in accordance with this section should be submitted in accordance with 10CFR72.4.

4.1.2 Transfer Cask

4.1.2.1 Structural Performance

The TRANSFER CASK has been evaluated for a side drop resulting in a lateral gravitational loading of 60 *g*.

The TRANSFER CASK factors of safety due to Design Basis Earthquake (DBE) and all associated load combinations have been evaluated for all possible modes of failure. The DBE peak accelerations are defined as 0.25 *g* in two orthogonal horizontal directions and 0.25 *g* in the vertical direction.

4.1.2.2 Codes and Standards

The FuelSolutions™ W100 TRANSFER CASK is designed in accordance with Subsection NF of the ASME Code. Exceptions to the code are listed in Table 4.1-2.

4.1.2.3 Fabrication Exceptions to Codes, Standards, and Criteria

Proposed alternatives to Subsection NF of the ASME Code, including exceptions allowed by Section 4.1.2.2, may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or Designee. The applicant should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of ASME Code, Section III, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for exception in accordance with this section should be submitted in accordance with 10CFR72.4.

4.1.3 Canister

4.1.3.1 Criticality

See each individual CANISTER Technical Specification Section 4.1.3.1 for discussion of CANISTER criticality control features.

4.1.3.2 Structural Performance

See each individual CANISTER Technical Specification Section 4.1.3.2 for discussion of CANISTER structural performance features.

4.1.3.3 Codes and Standards

See each individual CANISTER Technical Specification Section 4.1.3.3 for discussion of codes and standards applicable to the CANISTER.

4.1.3.4 Fabrication Exceptions to Codes, Standards, and Criteria

See each individual CANISTER Technical Specification Section 4.1.3.4 for discussion of exceptions to codes, standards, and criteria.

4.0 Design Features

4.2 Storage Pad

4.2.1 Storage Location for Storage Casks

Each STORAGE CASK is designed to radiate sufficient heat when placed on the storage pad in the appropriate location. Thermal analyses of normal STORAGE OPERATIONS (Storage System FSAR, Section 4.4) assume that the casks will be stored in an array that places adjacent casks a minimum of 15 feet apart, center-to-center. This minimum spacing is an important parameter to the proper dissipation of radiant heat energy from the cask.

4.2.2 Pad Properties to Limit Cask Gravitational Loadings Due to Postulated Drops

4.2.2.1 Storage Cask

The FuelSolutions™ W150 STORAGE CASK has been evaluated for an end drop onto a reinforced concrete pad. The evaluations are based on the following parameters:

Concrete thickness (inches, max.)	24	30	36
Maximum Reinforcing Steel (EWEF)	#8 @ 18"	#9 @ 18"	#8 @ 12"
Nominal concrete 28 day compressive strength (psi)	3,000	3,000	3,000
Nominal reinforcement yield strength (psi)	60,000	60,000	60,000
Soil effective modulus of elasticity (psi, max.)	30,000	20,000	10,000
Drop height (inches, max.)	36	36	36

Any site-specific pad design with parameters that differ from those listed must be evaluated by the licensee to confirm that the design basis deceleration loads for the storage cask and canister are not exceeded. This evaluation must be performed using the same methodology as described in WSNF-200 FSAR, Section 3.7.3.1.

4.2.2.2 Transfer Cask

The FuelSolutions™ W100 Transfer Cask has been evaluated for a side drop onto a reinforced concrete pad. The evaluations are based on the following parameters:

Concrete thickness (inches, max.)	24
Minimum pad size	30' x 50'
Maximum Reinforcing Steel (EWEF)	#8 @ 18"

Nominal concrete 28 day compressive strength (psi)	3,000
Nominal reinforcement yield strength (psi)	60,000
Soil effective modulus of elasticity (psi, max.)	15,000
Drop height (inches, max.)	72

Any site-specific pad design with parameters that differ from those listed must be evaluated by the licensee to confirm that the design basis deceleration loads for the transfer cask and canister are not exceeded. This evaluation must be performed using the same methodology as described in WSNF-200 FSAR, Section 3.7.5.1.

4.3 Site Specific Parameters and Analyses

The minimum site-specific parameters and analyses that will need verification by the system user are:

4.3.1 Fire and Explosion

The potential for fire and explosion shall be addressed, based on site-specific considerations. This includes the condition that the on-site transporter fuel tank will contain no more than 70 gallons of fuel.

For the purpose of providing the licensee with design basis loading criteria for comparison to site-specific hazards, a postulated explosion is taken to be the same as the tornado wind pressure load defined in Section 2.3.4.2 of the Storage System FSAR (WSNF-200).

4.3.2 Engineered Features

In cases where engineered features (i.e., berms, shield walls) are used to ensure that the requirements of 10CFR72.104(a) are met, such features are to be considered important to safety and must be evaluated to determine the applicable Quality Assurance Category.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
ACI 349:			
1	**General for ACI 349**	The use of the term "Owner" does not apply.	Where the term "Owner" is used, the FuelSolutions™ SFMS licensee, BNG Fuel Solutions (BFS), should be substituted.
2	**General for Chapter 1 - "General Requirements"**	References to "construction" do not apply.	Refer to ACI 318.
3	**1.1 - "Scope:"** "This Code provides the minimum requirements for the design and construction of nuclear safety related concrete structures and structural elements for nuclear power generating stations."	The FuelSolutions™ W150 Storage Cask will not be constructed as a 10CFR50, Appendix B, "safety related" component.	The FuelSolutions™ W150 Storage Cask will be constructed based on a 10CFR72 "graded quality" approach.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
4	**1.2 - "Drawings and Calculations:"** "1.2.1 - Copies of structural drawings, typical details, and specifications for all reinforced concrete construction shall be signed by a licensed engineer and shall be retained by the Owner, or his designee, as a permanent record for the life of the structure. These drawings, details, and specifications shall show . . . provisions for dimensional changes resulting from creep, shrinkage, and temperatures; . . . and loads used in the design."	1. The FuelSolutions™ W150 Storage Cask drawings, typical details, and specifications will not necessarily be signed by a licensed engineer. 2. Provisions for dimensional changes will not be specifically addressed on structural drawings. 3. Loads used in the design will not be shown on drawings, typical details, or specifications.	1. Licensed engineer certification of drawings, typical details, and specifications is not typically provided for components licensed under 10CFR72. 2. Finished storage cask will meet dimensional inspection requirements provided in this FSAR. 3. Loads used in the design are presented in this FSAR.
5	1.3 - "Inspection"	This section does not apply.	Refer to ACI 318.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
6	**1.5 - "Quality Assurance Program:"** "A quality assurance program covering nuclear safety related structures shall be developed prior to starting any work. The general requirements and guidelines for establishing and executing the quality assurance program during the design and construction phases of nuclear power generating stations are established by Title 10 of the Code of Federal Regulations, Part 50 (10CFR50), Appendix B."	The construction of the FuelSolutions™ W150 Storage Cask will not be governed by a 10CFR50, Appendix B, QA program.	The construction of the FuelSolutions™ W150 Storage Cask will be governed by a 10CFR72, Subpart G, QA program.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
7	**Chapter 3 - "Materials"**	Sections 3.1, 3.2.3, 3.3.4, 3.5.3.2, 3.6.7, and 3.7 do not apply.	Refer to ACI-318, Sections 3.1 and 3.7. ACI 349 Sections 3.2.3, 3.3.4, 3.5.3.2, and 3.6.7 pertain to testing frequencies that are not provided in ACI 318. These frequencies will be established to be consistent with the graded quality category of the item as addressed under the BFS QA Program.
7 (cont.)	**Section 3.8 - "Standards Cited in this Code"**	Different editions of the ASTM standards listed may be used in the construction of a FuelSolutions™ W150 Storage Cask.	Materials and testing will be to the ASTM standard cited in ACI 349 and ACI 318, except that the year of the ASTM standard may be as cited in ACI 318-95 or the latest ASTM standard issued.
8	**Chapter 4 - "Concrete Quality"**	With the exception of Section 4.1.4, this chapter does not apply.	Refer to ACI 318, Chapter 4.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
9	**Chapter 5 - "Mixing and Placing Concrete"**	This chapter does not apply.	Refer to ACI 318, Chapter 5.
10	**Chapter 6 - "Formwork, Embedded Pipes, and Construction Joints"**	With the exception of Sections 6.3.7(k) and 6.3.8, this chapter does not apply.	Refer to ACI 318, Chapter 6
11	**9.1.1.2 - "Severe Environmental Loads"** **9.1.1.3 - "Extreme Environmental Loads"**	These load definitions are not used in the design of the FuelSolutions™ W150 Storage Cask.	Load definitions from NUREG-1536 are used in the design of the FuelSolutions™ W150 Storage Cask.
12	**9.2 - "Required Strength:"** 9.2.1 - "The required strength *U* shall be at least equal to the greatest of the following: *... (load combination no's. 1 - 11)*"	The FuelSolutions™ W150 Storage Cask design does not use load combinations from ACI 349.	The FuelSolutions™ W150 Storage Cask design uses load combinations from ANSI/ANS 57.9, as modified by NUREG-1536.
13	**Chapter 13 - "Two-Way Slab Systems"**	Not applicable.	
14	**Chapter 15 - "Footings"**	Not applicable.	

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
15	**16.2 - "Design:"** "16.2.1 - Design of precast members shall consider loading and restraint conditions from initial fabrication to completion of the structure, including form removal, storage, transportation, and erection."	The FuelSolutions™ W150 Storage Cask design does not explicitly address transportation loads on precast sections.	Off-normal operating condition transportation loads are assumed to be bounded by postulated accident condition side drop loads.
16	**Chapter 17 - "Composite Concrete Flexural Members"**	Not applicable.	
17	**Chapter 18 - "Prestressed Concrete"**	Not applicable.	
18	**Chapter 19 - "Shells and Folded Plate Members"**	Not applicable.	
19	**Appendix A - "Thermal Considerations"**	A FuelSolutions™ W150 Storage Cask may be exposed to conditions (accident fire) not within the scope of ACI 349.	Short-term material temperature limits for accident fire are defined in this FuelSolutions™ Storage System FSAR.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
20	**Appendix B - "Steel Embedments"**	Load combinations are only required to meet ACI 349 requirements.	Load combinations and variation requirements will meet both ACI 349 and ANSI/ANS 57.9.
21	**Appendix C - "Special Provisions for Impulsive ad Impactive Effects"**	Load combinations are only required to meet ACI 349 requirements.	Load combinations and variation requirements will meet both ACI 349 and ANSI/ANS 57.9.
ACI 318:			
22	**Chapter 1 - "General Requirements"**	With the exception of Section 1.3, this chapter does not apply.	Refer to ACI 349.
23	**Chapter 2 - "Definitions"**	This chapter does not apply.	Refer to ACI 349.
24	**Chapter 3 - "Materials"**	With the exception of Sections 3.1 and 3.7, this chapter does not apply.	See Item 7.
25	**Chapter 7 - "Details of Reinforcement"**	This chapter does not apply.	Refer to ACI 349.
26	**Chapter 8 - "Analysis and Design - General Considerations"**	This chapter does not apply.	Refer to ACI 349.

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
27	**Chapter 9 - "Strength and Serviceability Requirements"**	This chapter does not apply.	Refer to ACI 349.
28	**Chapter 10 - "Flexure and Axial Loads"**	This chapter does not apply.	Refer to ACI 349.
29	**Chapter 11 - "Shear and Torsion"**	This chapter does not apply.	Refer to ACI 349.
30	**Chapter 12 - "Development and Splices of Reinforcement"**	This chapter does not apply.	Refer to ACI 349.
31	**Chapter 13 - "Two-Way Slab Systems"**	Not applicable.	
32	**Chapter 14 - "Walls"**	This chapter does not apply.	Refer to ACI 349.
33	**Chapter 15 - "Footings"**	Not applicable.	
34	**Chapter 16 - "Precast Concrete"**	This chapter does not apply.	Refer to ACI 349.
35	**Chapter 17 - "Composite Concrete Flexural Members"**	Not applicable.	
36	**Chapter 18 - "Prestressed Concrete"**	Not applicable.	

Table 4.1-1 - FuelSolutions™ W150 Storage Cask ACI Code Requirement Compliance Summary (9 Pages)

Item	ACI Requirement	Issue	Alternative Compliance Basis
37	**Chapter 19 - "Shells and Folded Plate Members"**	Not applicable.	
38	**Chapter 20 - "Strength Evaluation of Existing Structures"**	Not applicable.	
39	**Chapter 21 - "Special Provisions for Seismic Design"**	Not applicable.	
40	**Chapter 22 - "Structural Plain Concrete"**	Not applicable.	
41	**Appendix A - "Alternate Design Method"**	This chapter does not apply.	Refer to ACI 349.
42	**Appendix B - "Unified Design Provisions for Reinforced and Prestressed Concrete Flexural and Compression Members"**	This chapter does not apply.	Refer to ACI 349.
43	**Appendix C - "Alternative Loads and Strength Reduction Factors"**	This chapter does not apply.	Refer to ACI 349.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
Section III, Subsection NCA:			
1	**General for Subsection NCA**	1. The terms "Certificate Holder" and "Owner" used throughout this subsection are not applicable for a 10CFR72 system. 2. The Division 2 (concrete) requirement provided throughout this subsection are not applicable for a 10CFR72 system.	1. BNG Fuel Solutions (BFS) bears the responsibilities associated with a "Certificate Holder" or "Owner" relative to the FuelSolutions™ SFMS. 2. This compliance summary table only addresses FuelSolutions™ W100 Transfer Casks, which do not contain any concrete.
2	**NCA-1140, "Use of Code Editions, Addenda, and Cases:"** "(a)(1) Under the rules of this Section, the Owner or his designees shall establish the Code Edition and Addenda to be included in the Design Specifications . . ."	The FuelSolutions™ SFMS documentation does not include an ASME Code Design Specification.	The requirements and criteria typically contained in an ASME Code Design Specification are contained in this FSAR.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
3	**NCA-1210, "Components:"** "Each component of a nuclear power plant shall require a Design Specification (NCA-3250), Design Report (NCA-3350, NCA-3550), and other design documents specified in NCA-3800. Data Reports and stamping shall be as required in NCA-8000."	The FuelSolutions™ SFMS documentation does not contain the following ASME Code documents: 1. Design Specification 2. Design Report 3. Owner's Certificate of Authorization 4. Authorized Inspection Agency written agreement 5. Owner's Data Report 6. Overpressure Protection Report	1. See Item 2. 2. The information typically reported in an ASME Code Design Report is contained in this FSAR. 3. An Owner's Certificate of Authorization, a written agreement with an Authorized Inspection Agency, an Owner's Data Report, and an Overpressure Protection Report are not typically provided for components licensed under 10CFR72.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
4	**NCA-1220, "Materials"**	Not all non-pressure retaining materials specified in the FuelSolutions™ W100 Transfer Cask FSAR are listed as ASME Code Section III materials.	FuelSolutions™ W100 Transfer Casks will be purchased, identified, controlled, and manufactured using a graded quality approach in accordance with the NRC-approved BFS Quality Assurance Program based on NQA-1, NRC Regulatory Guide 7.10, and NUREG/CR-6407 criteria.
5	**NCA-1281, "Activities and Requirements:"** "... Data Reports and stamping shall be as required in NCA-8000."	See Item 19.	See Item 19.
6	**NCA-2000, "Classification of Components"**	The classification of components is usually provided in a Design Specification.	See Item 2.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
7	**NCA-2142, "Establishment of Design, Service, and Test Loadings and Limits:"** "In the Design Specification, the Owner or his designee shall identify the loadings and combinations of loadings and establish the appropriate Design, Service, and Test Limits for each component or support . . ."	See Item 2.	See Item 2.
8	**NCA-3100, "General"**	ASME Code accreditation does not apply.	See Item 1.
9	**NCA-3200, "Owner's Responsibilities"**	An Owner's responsibilities under ASME Code do not apply.	An Owner's Certificate of Authorization, a Design Specification, a Design Report, an Overpressure Protection Report, and an Owner's Data Report are not typically provided for components licensed under 10CFR72.
10	**NCA-3300, "Responsibilities of a Designer - Division 2"**	See Item 1.	See Item 1.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
11	**NCA-3400, "Responsibilities of an N Certificate Holder - Division 2"**	See Item 1.	See Item 1.
12	**NCA-3500, "Responsibilities of an N Certificate Holder - Division 1"**	See Item 1.	See Item 1. Design and fabrication requirements are provided in this FSAR and related procurement/fabrication drawings and specifications.
13	**NCA-3600, "Responsibilities of an NPT Certificate Holder"**	See Item 1.	See Item 12.
14	**NCA-3700, "Responsibilities of an NA Certificate Holder"**	See Item 1.	See Item 12.
15	**NCA-3800, "Metallic Material Organization's Quality System Program"**	Materials for a FuelSolutions™ W100 Transfer Cask may be purchased from suppliers that are not certified per the requirements of NCA-3800.	Material suppliers will be qualified per NCA-3800 or the NRC-approved BFS Quality Assurance Program based on the requirements of NQA-1, NRC Regulatory Guide 7.10, and NUREG/CR-6407 criteria.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
16	**NCA-3900, "Nonmetallic Material Manufacturer's and Constituent Suppliers Quality System Programs"**	See Item 1.	See Item 1.
17	**NCA-4000, "Quality Assurance"**	These quality assurance requirements do not apply.	See Item 4.
18	**NCA-5000, "Authorized Inspection"**	The manufacturing or operation of the FuelSolutions™ SFMS will not use an Authorized Inspection Agency.	An Authorized Inspection Agency is not typically used in the manufacturing or operation of components licensed under 10CFR72.
19	**NCA-8000, "Certificates of Authorization, Nameplates, Code Symbol Stamping, and Data Reports"**	The FuelSolutions™ SFMS will not use an ASME Code Certificate of Authorization, Code Symbol Stamping, or a Data Report.	An ASME Code Certificate of Authorization, Code Symbol Stamping, or a Data Report are not typically required for components licensed under 10CFR72. Nameplate information will be provided on each FuelSolutions™ W100 Transfer Cask.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
Section III, Subsection NF:			
20	**NF-1111.1, "Design Requirements:"** "In addition to the requirements of NCA-3240, the Owner shall be responsible that loads . . . are adequately transferred without loss of the pressure boundary integrity for the Design or Service Loadings specified in the Design Specification governing the component or piping."	The FuelSolutions™ SFMS documentation does not contain an ASME Code Design Specification.	The requirements and criteria typically contained in an ASME Code Design Specification are contained in this FuelSolutions™ Storage System FSAR.
21	**NF-1130, "Boundaries of Jurisdiction"**	See Item 6.	See Item 6.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
22	**NF-2121, "Permitted Material Specifications:"** ". . . (b) The requirements of this Article do not apply to such as gaskets, seals, . . . Requirements, if any, for these materials shall be stated in the Design Specification (NCA-3850)."	See Item 2.	See Item 2.
23	**NF-2130, "Certification of Material:"** "(a) Material used in construction of component supports shall be certified. Certified Material Test Reports in accordance with NCA-3867.4 shall be provided."	See Item 15.	See Item 15. When CMTRs are required by the BFS Quality Assurance Program, they will be provided per the requirements of NCA-3862.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
24	**NF-2160, "Deterioration of Material In Service:"** "It is the responsibility of the Owner to select material suitable for the conditions stated in the Design Specifications (NCA-3250), with specific attention being given to the effects of Service Conditions upon the properties of the material."	See Item 6.	See Item 6.
25	**NF-2310, "Material to be Impact Tested"**	See Item 6.	See Item 6.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
26	**NF-2610, "Documentation and Maintenance of Quality System Programs:"** "(a) Except as provided in (b) below, Material Manufacturers and Material Suppliers shall have a Quality System Program or an Identification and Verification Program, as applicable, which meets the requirements of NCA-3800. . . ."	See Item 15.	See Item 15.
27	**NF-3112.1, "Design Temperature"**	The FuelSolutions™ W100 Transfer Cask may be exposed to conditions (accident fire) not within the scope of the ASME Code.	Short-term material temperature limits for accident fire are defined in this FuelSolutions™ Storage System FSAR.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
28	**NF-3113, "Service Conditions:"** "Each service condition to which the piping or component may be subjected shall be categorized in accordance with NCA-2142.2 and Service Limits [NCA-2142.4(b)] designated in the Design Specifications in such detail as will provide a complete basis for design in accordance with this Article."	See Item 6.	See Item 6.
29	**NF-3132, "Stress Analysis:"** "A detailed stress analysis or Design Report, as required by NCA-3550 for all piping or component supports, shall be prepared in sufficient detail to show that each of the stress limits of NF-3200 or NF-3300 is satisfied when the piping component support is subjected to the loadings of NF-3110."	See Item 3.	See Item 3.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
30	**NF-3220, "Design by Analysis for Class 1"**	See Item 3.	See Item 3.
31	**NF-3226.1, "Permissible Types of Welded Joints in Plate- and Shell-Type Supports:"** (This section presents permissible weld configurations for butt, corner, and tee joints.)	The inner liner and outer structural shell do not employ 360E circumferential butt weld joints in their attachments to the top and bottom flanges of the cask.	The inner liner and outer structural shell employ modified 360E circumferential "corner joint" welds in their attachments to the top and bottom flanges of the transfer cask. as shown in this FuelSolutions™ Storage System FSAR.
32	**NF-4121, "Means of Certification:"** "The Certificate Holder for an item shall certify, by application of the appropriate Code Symbol and completion of the appropriate Data Report in accordance with NCA-8000, that materials used comply with the requirements of NB-2000 and that the fabrication or installation complies with the requirements of NF-4000."	The FuelSolutions™ SFMS will not use an ASME Code Symbol Stamp or a Data Report.	An ASME Code Symbol Stamping or Data Report are not typically required for components licensed under 10CFR72. Also see Item 15.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
33	**NF-4213, "Qualification of Forming Processes for Impact Property Requirements"**	See Item 2.	See Item 2.
34	**NF-4724, "Bolt Tension:"** "All high strength structural bolts shall be preloaded to a value not less than that given in the Design Specification . . ."	See Item 2.	See Item 2.
35	**"Testing"**	1. Though not a Subsection NF requirement, the FuelSolutions™ W100 Transfer Cask fuel and neutron shield cavities will be hydrostatically tested to determine their leak tightness. 2. Though not a Subsection NF requirement, the FuelSolutions™ W100 Transfer Cask trunnions will be load tested per ANSI N14.6 requirements.	1. The FuelSolutions™ W100 Transfer Cask fuel and neutron shield cavity hydrostatic test pressures are presented in this FuelSolutions™ Storage System FSAR. 2. The FuelSolutions™ W100 Transfer Cask trunnion test load magnitude is presented in this FuelSolutions™ Storage System FSAR.

Table 4.1-2 - FuelSolutions™ W100 Transfer Cask ASME Code Requirement Compliance Summary (14 Pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
36	**"Overpressure Protection"**	Though not a Subsection NF requirement, the FuelSolutions™ W100 Transfer Cask neutron shield will employ a pressure relief device. The use of this device will not be documented in an ASME Code Overpressure Protection Report.	The FuelSolutions™ W100 Transfer Cask neutron shield pressure relief device set pressure is presented in this FuelSolutions™ Storage System FSAR.
37	**NF-8000, "Nameplates, Stamping, and Reports"**	The FuelSolutions™ SFMS will not use ASME Code Symbol Stamping, or a Data Report.	ASME Code Symbol Stamping or a Data Report are not typically required for components licensed under 10CFR72. Nameplate information will be provided on the FuelSolutions™ W100 Transfer Cask.

5.0 ADMINISTRATIVE CONTROLS

5.1 Training Modules

Training modules shall be developed under the general licensee's training program as required by 10CFR72.212(b)(6). Training modules shall require a comprehensive program for the operation and maintenance of the FuelSolutions™ spent fuel storage system and the independent spent fuel storage installation (ISFSI). The training modules shall include the following elements, at a minimum:

- FuelSolutions™ SFSS design (overview)
- ISFSI facility design (overview)
- Systems, structures, and components important to safety (overview)
- FuelSolutions™ SFSS and CANISTER storage Safety Analysis Report (overview)
- NRC Safety Evaluation Report (overview)
- Certificate of Compliance conditions
- FuelSolutions™ Technical Specifications
- Applicable regulatory requirements (e.g., 10CFR72, Subpart K, 10CFR20, 10CFR73)
- Required instrumentation and use
- Operating experience reviews
- FuelSolutions™ operating and maintenance procedures, including:
  - Fuel qualification and loading
  - Rigging and handling
  - LOADING OPERATIONS as described in Chapter 8 of the FSAR
  - UNLOADING OPERATIONS including reflooding as described in Chapter 8 of the FSAR
  - Auxiliary equipment operations and maintenance (i.e., vacuum drying, helium backfilling, leak testing, reflooding)
  - Transfer operations including loading and unloading of the transport vehicle
  - ISFSI surveillance operations
  - Radiation protection
  - Maintenance
  - Security
  - Off-normal and accident conditions, responses, and corrective actions

5.2 Preoperational Testing and Training Exercises

A preoperational training exercise of the FuelSolutions™ Storage System is to be conducted prior to the first use of any system component or conduct of any specific operation that may include, but is not limited to, the following:

- Moving a transfer cask/canister into the spent fuel pool.
- Loading an SNF assembly. This includes operations associated with selecting, loading, and independent verification of a dummy SNF assembly.
- Placing the top shield plug and removal of transfer cask/canister from the spent fuel pool.
- Canister sealing, vacuum drying, and cover gas backfill operations using a mock-up canister subassembly.
- Transfer cask upending/downending on the horizontal transfer trailer.
- Storage cask upending/downending.
- Horizontal canister transfer from the transfer cask to and retrieval from the storage cask.
- Horizontal canister transfer from the transfer cask to and retrieval from the transportation cask.
- Horizontal canister transfer from the transportation cask to and retrieval from the storage cask.
- Vertical canister transfer from the transfer cask to and retrieval from the storage cask.
- Vertical canister transfer from the transfer cask to and retrieval from the transportation cask.
- Canister reflood and opening using a mock-up canister subassembly.

Subsequent training will be in accordance with site-specific procedures.

5.3 Programs

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

5.3.1 Cask Sliding Evaluation

The FuelSolutions™ W150 STORAGE CASK has been evaluated for sliding in the unlikely events of a seismic event. A sliding coefficient of friction of 0.3 is used in these analyses. This program provides a means for evaluating the coefficient of friction to assure that the cask will not slide significantly during the seismic event.

5.3.1.1 Pursuant to 10CFR72.212, this program shall evaluate the site-specific ISFSI pad configurations/conditions to assure that the cask would not slide significantly during the postulated design basis earthquake. The program shall conclude that the surface sliding friction coefficient of friction is greater than or equal to 0.3.

5.3.1.2 Alternatively, for site-specific ISFSI pad configuration/conditions with a lower sliding coefficient of friction than 0.3, the program shall evaluate the site-specific conditions to assure that the FuelSolutions™ W150 STORAGE CASK will not slide significantly during the postulated design basis earthquake. The program shall also evaluate storm winds, missile impacts and flood forces to assure that the cask will not slide such that it could result in impact with other casks or structures at the ISFSI. The program shall assure that these alternative analyses are documented and controlled.

5.3.2 Cask Transport Evaluation Program

This program provides a means for evaluating various transport configurations and transport route conditions to assure that the design basis drop limits are met.

5.3.2.1 Pursuant to 10CFR72.212, this program shall evaluate the site-specific transport conditions. To demonstrate compliance with Technical Specification 4.2.2, the program shall conclude that the expected lift height above the transport surface shall be less than or equal to that described by Technical Specification 4.2.2. Also, the program shall conclude that the transport route conditions (e.g., surface hardness and pad thickness) are equivalent to or less limiting than those prescribed for the typical pad surfaces which form the basis for Technical Specification 4.2.2.

5.3.2.2 Alternatively, for site-specific transport conditions which are not encompassed by those of Technical Specification 4.2.2, the program shall evaluate the site-specific conditions to assure that the STORAGE CASK end-drop loading does not exceed 88.5 *g* and the TRANSFER CASK side drop loading does not exceed 60 *g*. This alternative analysis shall be commensurate with the analysis which forms the basis of Technical Specification 4.2.2 (Reference FuelSolutions™ Storage System FSAR, Section 3.7). The program shall assure that these alternative analyses are documented and controlled.

5.3.2.3 This program shall establish administrative controls and procedures to assure that cask transport operations are conducted within the limits imposed by the Technical Specification or the alternative analysis described above.

5.3.3 Technical Specifications (TS) Bases Control Program

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

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

5.3.3.2 Licensees may make changes to Bases without prior NRC approval provided the changes do not involve either of the following:

- A change in the TS incorporated in the license
- A change to the FSAR or Bases that involves an unreviewed safety question, a significant increase in occupational exposure, or a significant unreviewed environmental impact as defined in 10CFR72.48.

5.3.3.3 The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the FSAR.

5.3.3.4 Proposed changes that do not meet the criteria of 5.3.3.2 above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10CFR72.48(b)(2).

5.3.4 Radioactive Effluent Control Program

This program implements the requirements of 10CFR72.44(d).

5.3.4.1 The FuelSolutions™ Storage System does not create any radioactive materials or have any radioactive waste treatment systems. Therefore, specific operating procedures for the control of radioactive effluents are not required. Specification 3.1.3, CANISTER Leak Rate, provides assurance that there are essentially no radioactive effluents from the CANISTERs.

5.3.4.2 This program includes an environmental monitoring program. The FuelSolutions™ Storage System may be included in a site environmental monitoring program.

5.3.4.3 An annual report shall be submitted pursuant to 10CFR72.44(d)(3) specifying the quantity of each of the principal radionuclides released to the environment in liquid and in gaseous effluents during the previous calendar year of operation.

5.3.5 Cask Surface Dose Rate Evaluation Program

This program provides a means for ensuring that ISFSIs using FuelSolutions™ STORAGE CASKS do not violate the requirements of 10CFR72 and 10CFR20 regarding radiation doses and dose rates.

5.3.5.1 As part of its evaluation pursuant to 10CFR72.212, the licensee shall perform an analysis to confirm that the limits of 10CFR20 and 10CFR72.104 will be satisfied under the actual site conditions and configurations considering the planned number of casks to be used and the planned fuel loading conditions.

5.3.5.2 On the basis of the analysis in 5.3.5.1, the licensee shall establish a set of cask surface dose rate limits which are to be applied to FuelSolutions™ STORAGE CASKS used at the site. Limits shall establish average gamma-ray and neutron dose rates for:

- The outside vertical surface of the STORAGE CASK at approximately 6 feet above the base.
- The inlet or outlet vent screen surfaces.
- The top lid.

5.3.5.3 Notwithstanding the limits established in TS 5.3.5.2, the dose rate limits may not exceed the following values:

- 50 mrem/hr on the side.
- 510 mrem/hr at the inlet or outlet vent screen surfaces.
- 50 mrem/hr on the top lid.

5.3.5.4 Within 12 hours following placement of the loaded STORAGE CASK on the ISFSI pad, the licensee shall measure the cask surface dose rates and calculate average values as described in 5.3.5.7 and 5.3.5.8.

The measured average dose rates shall be compared to the limits established in TS 5.3.5.2 or the limits in 5.3.5.3, whichever are lower.

5.3.5.5 If the measured average surface dose rates do not meet the limits of TS 5.3.5.2 or TS 5.3.5.3, whichever are lower, the licensee shall take the following actions:

- Notify the U.S. Nuclear Regulatory Commission (Director of the Office of Nuclear Material Safety and Safeguards) within 30 days.
- Administratively verify that the correct fuel was loaded.
- Perform an analysis to determine that placement of the as-loaded cask at the ISFSI will not cause the ISFSI to exceed the radiation exposure limits of 10CFR20 and 10CFR72.

5.3.5.6 If the analysis in 5.3.5.5 shows that placement of the as-loaded cask at the ISFSI will cause the ISFSI to exceed the radiation exposure limits of 10CFR20 and 10CFR72, the licensee shall remove all fuel assemblies from the cask within 30 days of the time of cask loading.

5.3.5.7 The surface dose rates shall be measured at the following points:

- At least eight readings taken at equal spacing around the outside vertical surface of the STORAGE CASK at approximately 6 feet above the base.
- The inlet or outlet vent screen surfaces.
- At least five readings taken on the top lid, with one reading from the center and the other four taken at equal spacing 30 inches from the center.

5.3.5.8 The average dose rates shall be determined as follows:

In each of the three measurement zones in 5.3.5.7, the sum of the dose rate measurements is divided by the number of measurements to determine the

average for that zone. The neutron and gamma-ray dose rates are averaged separately. Uniformly spaced dose rate measurement locations are chosen such that each point in a given zone represents approximately the same surface area.

5.3.6 Vacuum Drying Program

See the CANISTER Technical Specifications for the applicable information.

5.3.7 Cladding Oxide Thickness Measurement Program

See the CANISTER Technical Specifications for the applicable information.

5.3.8 Storage Cask Periodic Monitoring Program

The STORAGE CASK containing a CANISTER loaded with fuel has been evaluated for the unlikely event of full blockage of all STORAGE CASK inlet and outlet vent screens during STORAGE OPERATIONS. Transient thermal analyses have been performed for the blocked vent accident condition to determine the time at which the limiting short-term allowable temperature is reached in the STORAGE CASK. Periodic monitoring is required at intervals that are less than the time required to reach the limiting short-term temperature limit.

This program shall establish administrative controls and procedures to assure that the licensee will be able to determine when corrective action needs to be taken to maintain safe storage conditions. The required surveillance frequency for a STORAGE CASK containing a CANISTER loaded with fuel is as follows:

Total Heat Load (Q)	Surveillance Frequency
Q > 20 kW	24 hours (1 day)
15 kW < Q #20 kW	48 hours (2 days)
10 kW < Q #15 kW	96 hours (4 days)
5 kW < Q #10 kW	168 hours (1 week)
Q #5 kW	336 hours (2 weeks)

Acceptable means of monitoring the STORAGE CASK include periodic visual inspection of all STORAGE CASK inlet and outlet vent screens OR periodic STORAGE CASK liner thermocouple temperature readings. When the STORAGE CASK liner thermocouple temperature measurements are used as the means of monitoring, the following limits shall be met:

	Measured Thermocouple Temperature (EF)	
Total Heat Load (Q)	Normal Ambient (#100EF)	Off-Normal Ambient (#125EF)
Q > 20 kW	163	192
15 kW < Q #20 kW	156	181
10 kW < Q #15 kW	146	171
5 kW < Q #10 kW	136	161
Q #5 kW	126	151

Alternatively, the program may establish other suitable surveillance frequencies and liner thermocouple temperature limits to maintain the concrete temperature below the short-term allowable temperature of 350EF for a specific CANISTER heat load.

5.4 Special Requirements for First System in Place

See the CANISTER Technical Specifications for the applicable information.

TECHNICAL SPECIFICATIONS BASES
FOR THE FuelSolutions™ STORAGE SYSTEM

Revision 3

Page

B 2.0 FUNCTIONAL AND OPERATING LIMITS

BASES

See each individual CANISTER Technical Specification for applicable functional and operating limits bases.

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 unit 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.

(continued)

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. 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	Not Applicable.
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. ISFSI 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 ISFSI activities being required to exit the Applicability desired to be entered to comply with the Required Actions. Compliance with Required Actions that permit continued operation 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 ISFSI. 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. In addition, the provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability that are related to the unloading of a CANISTER. 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	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 comply with the applicable Required Actions(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 assure 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	Not Applicable.
LCO 3.0.7	Not Applicable.

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 assure that Surveillances are performed to verify the systems, components, and that 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 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 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 that has been determined to not meet the LCO because the ACTIONS define the remedial measures that apply. Surveillances have been 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

(continued)

SR 3.0.1 (continued)	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.
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 plant operating conditions that may not 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 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 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.

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 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 that become 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.

(continued)

SR 3.0.3 (continued)

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.

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 assures that system and component requirements and variable limits are met before entry into specified conditions in the Applicability for which these systems and component assure 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, 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. In addition, the provisions of LCO 3.0.4 shall not prevent changes in specified conditions in the Applicability that are related to the unloading of a CANISTER.

(continued)

SR 3.0.4 (continued)

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 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 Section 1.4, Frequency.

B 3.1 CANISTER INTEGRITY

B 3.1.1 Canister Helium Backfill Density

BASES

See each individual CANISTER Technical Specification for the applicable LCO Bases.

B 3.1 CANISTER INTEGRITY

B 3.1.2 Canister Vacuum Drying Pressure

BASES

BACKGROUND	A TRANSFER CASK with an empty CANISTER is placed in the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield plug is then placed in the CANISTER, and the TRANSFER CASK is raised to the spent fuel pool surface. The dose rates are measured near the center of the top shield plug. The TRANSFER CASK and CANISTER are then moved to the cask preparation area where the inner closure plate is welded to the CANISTER shell and a pressure test performed. The CANISTER is drained, vacuum-dried, and backfilled with helium. The CANISTER outer top closure plate is then welded to the CANISTER shell. Contamination measurements are completed prior to moving the TRANSFER CASK and CANISTER to the ISFSI. Vacuum drying is used to remove residual moisture from the CANISTER cavity after the water has been drained. Water that is not drained from the cavity evaporates from the fuel and surfaces due to the reduced vapor pressure of water in a vacuum. Evaporation is also aided by the temperature increase due to the heat generation of the fuel.
APPLICABLE SAFETY ANALYSIS	The confinement of radioactivity during the storage of spent fuel in the CANISTER within the STORAGE CASK is assured by the use of multiple confinement boundaries and systems. The barriers are the fuel pellet matrix, the metallic fuel cladding tubes in which the fuel pellets are contained, and the CANISTER in which the fuel assemblies are stored. Long-term integrity of the fuel and cladding depend on storage in a dry inert atmosphere. This is accomplished by removing water from the CANISTER and backfilling the cavity with an inert gas (Reference 1). The integrity of the CANISTER and fuel is demonstrated under vacuum drying conditions to meet the applicable thermal limits for steady-state conditions (Reference 2).
LCO	A stable vacuum pressure that is equal to or less than the specified pressure indicates that all water has evaporated and has been removed from the CANISTER cavity. Removing water from the CANISTER cavity helps maintain the long-term integrity of the fuel cladding.

BASES

APPLICABILITY	CANISTER cavity vacuum drying is performed during LOADING OPERATIONS prior to transporting the CANISTER to the ISFSI (Reference 1).
ACTIONS	A note has been added to the Actions stating that a separate Condition entry is allowed for each CANISTER. This is acceptable since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions. A.1 If the cavity vacuum drying pressure cannot be met, actions must be taken to meet the LCO. Failure to successfully complete vacuum drying may have many causes, such as failure of the vacuum drying system, inadequate draining, ice clogging the drain lines, or leaking welds between the inner closure plate and the CANISTER shell and the vent and drain port bodies. The Completion Time of "prior to continuing LOADING OPERATIONS" is appropriate since the time required to determine and correct most failure mechanisms is indeterminate and continued vacuum conditions do not affect the safe storage of spent fuel assemblies.
SURVEILLANCE REQUIREMENTS	SR 3.1.2.1 The long-term integrity of the stored fuel is dependent on storage in a dry, inert environment. Cavity dryness is demonstrated by evacuating the cavity to a very low pressure and verifying that the pressure is held over a specified period of time. A low vacuum pressure is an indication that the cavity is dry. This dryness test must be performed successfully on each CANISTER before placing in storage. The test must be performed prior to final inerting and closure of the CANISTER. Since water removal is performed with inert gas, the fuel is not exposed to an oxidizing atmosphere during draining and drying operations. Therefore, the completion time is appropriate.
REFERENCES	1. FuelSolutions™ Storage System FSAR, Section 8.1.8. 2. FuelSolutions™ Canister Storage FSAR, Section 4.5

B 3.1 CANISTER INTEGRITY

B 3.1.3 Canister Leak Rate

BASES

BACKGROUND	A TRANSFER CASK with an empty CANISTER is placed in the spent fuel pool and loaded with fuel assemblies meeting the requirements of the Functional and Operating Limits. A shield plug is then placed in the CANISTER, and the TRANSFER CASK is raised to the spent fuel pool surface. The dose rates are measured near the center of the top shield plug. The TRANSFER CASK and CANISTER are then moved to the cask preparation area where the inner closure plate is welded to the CANISTER shell and a pressure test performed. The CANISTER is drained, vacuum-dried, and backfilled with helium. The CANISTER outer top closure plate is then welded to the CANISTER shell. Contamination measurements are completed prior to moving the TRANSFER CASK and CANISTER to the ISFSI. A CANISTER leak rate is specified to assure the CANISTER confinement boundary, to maintain an inert helium atmosphere in the CANISTER during storage throughout the 100-year design life (to prevent fuel cladding degradation and promote heat transfer), and to confine all radioactive materials during storage.
APPLICABLE SAFETY ANALYSIS	The confinement of radioactivity during the storage of spent fuel in the CANISTER within the STORAGE CASK is assured by the use of multiple confinement boundaries and systems. The barriers are the fuel pellet matrix, the metallic fuel cladding tubes in which the fuel pellets are contained, and the CANISTER in which the fuel assemblies are stored. Long-term integrity of the fuel and cladding depend on storage in a dry inert atmosphere. This is accomplished by removing water from the CANISTER and backfilling the cavity with an inert gas (Reference 1).
LCO	Verifying the CANISTER leak rate is within the limit will assure the assumptions in the radiological evaluations are maintained. The helium leak rate value (not to exceed 8.52×10^{-6} ref-cc/sec) is used in the confinement analysis presented in Chapter 7 of each CANISTER FSAR (Reference 2).
APPLICABILITY	The helium leak rate measurement is performed during LOADING OPERATIONS prior to transferring the CANISTER to the ISFSI. TRANSFER OPERATIONS would not begin if the helium leak rate were not within the limit. Therefore, testing for CANISTER leak tightness is not required during TRANSFER OPERATIONS or STORAGE OPERATIONS.

ACTIONS

A note has been added to the ACTIONS stating that a separate Condition entry is allowed for each CANISTER. This is acceptable since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

A.1

If the leakage rate of the inner closure plate weld exceeds the specified limit, actions must be taken to meet the LCO. Such actions may include:

- Checking the CANISTER vent and drain port fittings for leaks, and repairing or replacing as required.
- Checking the inner closure plate weld for any indications of leakage, and repairing as required.
- Checking the inner closure plate for any surface indications resulting in leakage, and repairing as required.

The Completion Time is sufficient to determine and correct most failures that would cause a helium leak rate in excess of the limit.

B.1

If the CANISTER helium leak rate cannot be successfully returned to the specified limit, 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 return the fuel to the spent fuel pool in an orderly manner without challenging personnel.

SURVEILLANCE REQUIREMENTS	SR 3.1.3.1 A primary design consideration of the CANISTER is that it is sufficiently leak tight to assure that the helium remains in the CANISTER during long-term storage. The helium leak rate must be measured prior to placing each CANISTER in storage. A helium detection device is used to confirm that the leak rate is below the specified limit. The measurements are performed using calibrated instruments and procedures that comply with ANSI N14.5 or equivalent (Reference 3). Measuring the helium leak rate must be performed successfully on each CANISTER prior to placing it in storage. The surveillance must be performed within 48 hours. Verification of the integrity of the closure plate and associated welds by pressure testing must be performed successfully on each CANISTER prior to placing it in storage. The surveillance must be performed within 48 hours after verifying vacuum pressure during drying is within limit. This allows sufficient time to perform the surveillance while minimizing the time the fuel is in the CANISTER without verifying that the CANISTER is sealed.
REFERENCES	1. FuelSolutions™ Storage System FSAR, Section 8.1.8. 2. FuelSolutions™ Canister Storage FSAR Sections 7.2 and 7.3. 3. ANSI N14.5, *American National Standard for Leakage Tests on Packages for Shipment of Radioactive Materials*, January 1997.

B 3.1 CANISTER INTEGRITY

B 3.1.4 Hydraulic Ram Force During Horizontal Canister Transfer

BASES

BACKGROUND	After the CANISTER is loaded, dried, and sealed, it is transferred from the TRANSFER CASK to the STORAGE CASK. When this transfer is performed horizontally at the ISFSI, a hydraulic ram is used to push the CANISTER from the TRANSFER CASK into the STORAGE CASK. The CANISTER is retrieved from the STORAGE CASK by pushing the CANISTER from the STORAGE CASK to the TRANSFER CASK using the hydraulic ram.
APPLICABLE SAFETY ANALYSIS	The confinement of radioactivity during the storage of spent fuel in the CANISTER within the STORAGE CASK is assured by the use of multiple confinement boundaries and systems. The barriers are the fuel pellet matrix, the metallic fuel cladding tubes in which the fuel pellets are contained, and the CANISTER in which the fuel assemblies are stored. Long term integrity of the fuel and cladding are dependent on storage in a dry inert atmosphere. This is accomplished by removing water from the CANISTER and backfilling the cavity with inert gas. The structural integrity of the canister assures the continued maintenance of this environment.
LCO	Verifying that the force applied to the CANISTER by the hydraulic ram remains within the limit will assure that the CANISTER is not subjected to loads in excess of those analyzed in Chapter 3 of the applicable Canister Storage FSAR (Reference 1).
APPLICABILITY	The hydraulic ram force monitoring is performed during horizontal TRANSFER OPERATIONS (Reference 2).
ACTIONS	A note has been added to the ACTIONS stating that a separate Condition entry is allowed for each CANISTER. This is acceptable since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

(continued)

ACTIONS (continued)

A.1

If the hydraulic ram force exceeds the specified limit, horizontal transfer of the CANISTER must be stopped. The immediate completion time indicates the importance of not significantly exceeding the force limit. The monitoring of the ram force will typically be performed by monitoring the hydraulic fluid pressure. The pressure value corresponding to the limit will be dependent on the design of the ram (i.e., the ram internal area times the pressure equals the applied force). The hydraulic ram controls will typically be supplied with cut-off switches set to trip when the ram pressure reaches a pre-set value, typically at or just below the pressure corresponding to the hydraulic ram force limit. The reason for reaching the force limit usually is misalignment of the TRANSFER CASK and the STORAGE CASK. Other causes may include improperly installed rails in the STORAGE CASK, or damage to the sliding surface of the STORAGE CASK rails.

A.2

In order to determine the reason for the excessive ram force and to proceed with corrective actions, the CANISTER must be returned to the cask from which it was being transferred (e.g. if transferring from the TRANSFER CASK to the STORAGE CASK, return the CANISTER to the TRANSFER CASK).

A.3

The rails in the cask to which the CANISTER is to be transferred should be inspected for proper installation and for any damage. These are potential reasons for the excessive ram force.

A.4

The alignment of the casks should be reverified. LCO 3.5.2 provides the process for verifying alignment and correcting problems.

SURVEILLANCE REQUIREMENTS

SR 3.1.4.1

The hydraulic ram force must be continuously monitored during horizontal TRANSFER OPERATIONS when transferring the CANISTER between the STORAGE CASK and the TRANSFER CASK.

REFERENCES

1. FuelSolutions™ Canister Storage FSAR, Section 3.6.
2. FuelSolutions™ Storage System FSAR, Section 8.1.10.

B 3.1 CANISTER INTEGRITY

B 3.1.5 Canister Vertical Time Limit in Transfer Cask

BASES

See each individual CANISTER Technical Specification for the applicable LCO Bases.

B 3.2 CANISTER RADIATION PROTECTION

B 3.2.1 Canister Surface Contamination

BASES

BACKGROUND	A TRANSFER CASK with an empty CANISTER is placed in the spent fuel pool and loaded with spent fuel assemblies. As a result, the CANISTER surface may become contaminated with radioactive material from the spent fuel pool water. The non-fixed surface contamination on the canister is removed to prevent loose contamination from becoming airborne particulate and to prevent the STORAGE CASK from becoming contaminated during storage.
APPLICABLE SAFETY ANALYSIS	The ISFSI radiation protection measures are based on the assumption that the exterior surfaces of the CANISTERS have been decontaminated. Failure to decontaminate the surfaces of the CANISTERS could lead to higher-than-projected occupational doses and potential site contamination.
LCO	The specified maximum non-fixed contamination level complies with the guidance in NRC IE Circular No. 81-07 (Reference 1). By meeting these limits, the shipping container removable surface contamination requirements of 10CFR71.87(i)(l) (Reference 2), and 49CFR173.443 (Reference 3) are met. Consequently, these contamination levels are consistent with the exposure limits for the general public. This will assure that contamination limits of the inner surfaces of the storage cask are not exceeded and will alleviate potential releases of airborne particulate to the environment.
APPLICABILITY	CANISTER surface contamination is measured during LOADING OPERATIONS to assure that it is lower than the LCO limit. Measurement of CANISTER surface contamination occurs before TRANSFER OPERATIONS and STORAGE OPERATIONS. It is unnecessary during UNLOADING OPERATIONS because surface contamination would have been measured prior to moving the subject CANISTER to the ISFSI.
ACTIONS	A note has been added to the Actions stating that a separate Condition entry is allowed for each CANISTER. This is acceptable since the Required Actions for each Condition provide appropriate compensatory measures for each CANISTER not meeting the LCO. Subsequent CANISTERs that do not meet the LCO are governed by subsequent Condition entry and application of associated Required Actions.

(continued)

ACTIONS (continued)	A.1 If the removable external surface contamination of a CANISTER that has been loaded with spent fuel is not within the LCO limits, action must be initiated to decontaminate the CANISTER and bring the removable external surface contamination within limits. The Completion Time of 7 days is appropriate given that the time needed to complete the decontamination is indeterminate and surface contamination does not affect the safe storage of the spent fuel assemblies. B.1 If the contamination on the external surface of the CANISTER cannot successfully be removed within 7 days, the cause for the inability to remove the contamination must be determined and corrected. The CANISTER must be decontaminated to meet the LCO prior to moving the TRANSFER CASK out of the fuel building for horizontal CANISTER transfer.
SURVEILLANCE REQUIREMENTS	SR 3.2.1.1 This SR verifies that the CANISTER non-fixed surface contamination is lower than the LCO limits. The Frequency requires performing the verification prior to TRANSFER OPERATIONS in order to confirm that the CANISTER can be moved to the ISFSI without spreading loose contamination.
REFERENCES	1. IE Circular No. 81-07, Nuclear Regulatory Commission, 1981. 2. Title 10, U.S. Code of Federal Regulations, Part 71 3. Title 49, U.S. Code of Federal Regulations, Part 173

B 3.3 STORAGE CASK INTEGRITY

B 3.3.1 (Deleted) |

B 3.3 STORAGE CASK INTEGRITY

B 3.3.2 Storage Cask Periodic Monitoring

BASES

See each individual CANISTER Technical Specification for the applicable LCO bases.

B 3.3 STORAGE CASK INTEGRITY

B 3.3.3 Storage Cask Temperatures During Horizontal Transfer

BASES

See each individual CANISTER Technical Specification for the applicable LCO bases.

B 3.4 TRANSFER CASK INTEGRITY

B 3.4.1 Transfer Cask Structural Shell Temperature

BASES

BACKGROUND	The TRANSFER CASK is used to transfer a CANISTER containing fuel assemblies from the plant's fuel building to the ISFSI for horizontal TRANSFER OPERATIONS. The TRANSFER CASK includes a liquid neutron shield. To prevent damage to the neutron shield shell the liquid must not freeze. Damage to the neutron shield shell could result in less of the neutron shield fluid and increases in dose rates.
APPLICABLE SAFETY ANALYSIS	The TRANSFER CASK thermocouple measures the structural shell temperature, which is correlated through analysis to assure the TRANSFER CASK liquid neutron shield does not freeze (Reference 1).
LCO	Limiting the TRANSFER CASK structural shell temperature for TRANSFER OPERATIONS outside the plant's fuel building maintains the temperature of the liquid neutron shield above freezing, assuring that the TRANSFER CASK neutron shield shell maintains its integrity.
APPLICABILITY	This temperature limit applies to a TRANSFER CASK during on-site TRANSFER OPERATIONS outside the plant's fuel building.
ACTIONS	A.1 If the TRANSFER CASK does not meet the temperature limit, then actions should be taken to bring the temperature into compliance with the LCO. This may include such things as use of insulating blankets or heated blankets. The Completion Time is adequate to provide these mitigating measures and bring the temperature within the LCO. B.1 - B.4 If the TRANSFER CASK temperature cannot be brought within the LCO, then it is necessary to move the TRANSFER CASK to a heated area and inspect the neutron shield for damage. The Completion Time is adequate to perform the Required Actions.

SURVEILLANCE REQUIREMENTS	SR 3.4.1.1 The TRANSFER CASK shell temperature is to be verified once after a CANISTER with fuel assemblies is placed in it while the TRANSFER CASK is horizontal outside the plant's fuel building, and every hour thereafter during TRANSFER OPERATIONS.
REFERENCES	1. FuelSolutions™ Storage System FSAR, Section 4.4.

B 3.5 TRANSFER CASK RADIATION PROTECTION

B 3.5.1 Transfer Cask Surface Contamination

BASES

BACKGROUND	A TRANSFER CASK with an empty CANISTER is placed in the spent fuel pool and loaded with spent fuel assemblies. As a result, the TRANSFER CASK surface may become contaminated with radioactive material from the spent fuel pool water. The non-fixed surface contamination on the TRANSFER CASK is removed to prevent loose contamination from becoming airborne particulate.
APPLICABLE SAFETY ANALYSIS	The radiation protection and occupational exposure analyses are based on the assumption that the TRANSFER CASK surfaces are decontaminated (Reference 1). Failure to decontaminate the surfaces of the TRANSFER CASK could lead to higher than projected occupational doses.
LCO	The specified maximum non-fixed contamination level complies with the guidance in NRC IE Circular No. 81-07 (Reference 2). By meeting these limits, the shipping container removable surface contamination requirements of 10CFR71.87(i)(l) (Reference 3) and 49CFR173.443 (Reference 4) are met. Consequently, these contamination levels are consistent with the exposure limits for the general public. This will assure that contamination limits of the inner surfaces of the storage cask are not exceeded and will alleviate potential releases of airborne particulate to the environment.
APPLICABILITY	Verification that the TRANSFER CASK surface contamination is less than the LCO limit is performed prior to TRANSFER OPERATIONS, prior to the TRANSFER CASK leaving the plant's fuel building for horizontal canister transfer.
ACTIONS	A.1 If the removable external surface contamination of a TRANSFER CASK is not within the LCO limits, actions must be initiated to decontaminate the TRANSFER CASK and bring the removable surface contamination within limits. The Completion Time of 7 days is appropriate given that the time needed to complete the decontamination is indeterminate.

(continued)

ACTIONS (continued)	B.1 If the contamination on the surface of the TRANSFER CASK cannot successfully be removed within 7 days, the cause for the inability to remove the contamination must be determined and corrected. The TRANSFER CASK must be decontaminated to meet the LCO prior to moving the TRANSFER CASK out of the fuel building for horizontal CANISTER transfer.
SURVEILLANCE REQUIREMENTS	SR 3.5.1.1 This SR verifies that removable surface contamination on the TRANSFER CASK is lower than the limits of the LCO. The surveillance is performed using smear surveys to detect removable surface contamination. Performing the verification prior to TRANSFER OPERATIONS assures that TRANSFER OPERATIONS are performed without spreading loose contamination.
REFERENCES	1. FuelSolutions™ Storage System FSAR, Sections 10.3 and 10.4. 2. IE Circular No. 81-07, Nuclear Regulatory Commission, 1981. 3. Title 10, U.S. Code of Federal Regulations, Part 71. 4. Title 49, U.S. Code of Federal Regulations, Part 173.