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.

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 not result in separate entry into the Condition unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.

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.	Immediately.
	AND	
	A.2 Move CANISTER back to cask from which it was being transferred.	7 days.
	AND	
	A.3 Check STORAGE CASK rails for proper installation and damage.	Prior to proceeding with TRANSFER OPERATIONS.
	AND	
	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

5.0 Administrative Controls

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.