TECHNICAL SPECIFICATION

FOR THE FuelSolutions™ W21 CANISTER

to be used concurrent with

the Storage System Technical Specification

Amendment 4

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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 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

When "Immediately" is used as a Completion Time, the COMPLETION TIME 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

2.1 Functional and Operating Limits

2.1.1 Fuel to be Stored in the FuelSolutions™ W21 Canister

SFAs meeting the limits specified in Tables 2.1-1 and 2.1-2 may be stored in a W21 CANISTER.

2.2 Functional and Operating Limits Violations

If any Functional and Operating Limits are violated, the following actions shall be completed. These actions are not a substitute for the reporting requirements contained in 10CFR72.75.

2.2.1 The affected fuel assemblies shall be placed in a safe condition without delay and in a controlled manner.

2.2.2 The NRC Operations Center shall be notified within 24 hours.

2.2.3 A special report will be provided to NRC within 30 days that describes the cause of the violation, the actions to restore compliance, and the actions to prevent recurrence.

2.0 Functional and Operating Limits

Table 2.1-1
FuelSolutions™ W21 Loading Specification W21-1

W21-1 Payload Configuration Parameter	Full Loading of 21 Intact Fuel Assemblies Limit/Specification
Payload Description:	≤ 21 PWR fuel assemblies or PWR fuel assemblies with control components, as defined in Table 2.1-3. If less than 21 fuel assemblies are loaded, a dummy fuel assembly shall be placed into each empty CANISTER basket guide tube. Each dummy fuel assembly shall be the approximate weight and size of the actual fuel being loaded.
Maximum Weight per Assembly:	≤ 1,680 pounds
Heat Load Limit per Assembly:	1.05 kW
Cladding Material/Condition:	Intact zircaloy-clad fuel assemblies with no known or suspected cladding defects greater than hairline cracks or pinhole leaks. Partial fuel assemblies, i.e., fuel assemblies from which fuel rods are missing, must not be loaded into the CANISTER unless dummy fuel rods are inserted into the assembly in the locations of the missing rods. The dummy fuel rods shall displace an amount of water equal to that displaced by the original fuel rods.
Initial Enrichment:	The maximum acceptable enrichment varies by fuel assembly class and type and shall not exceed the enrichments defined in Table 2.1-3.
Burnup:	≤ 60,000 MWd/MTU.[1, 2]
Cooling Time:	The minimum acceptable cooling time varies by fuel assembly class and enrichment, as a function of burnup; and is also dependent on the total cobalt content of the fuel and control components. The effects of the maximum acceptable decay heat, initial uranium content, and gamma and neutron sources are incorporated into the minimum cooling time determination. Fuel assemblies shall not be stored with less than the minimum acceptable cooling time indicated in Tables 2.1-5 and 2.1-6.

Notes:

(1) The exposure (burnup) of any inserted control component must not exceed that of the host assembly.

(2) For burnups exceeding 45,000 MWd/MTU, cladding oxide layer thickness is limited to 70 Fm, to be determined in accordance with TS 5.3.7.

Table 2.1-2
FuelSolutions™ W21 Loading Specification W21-2

W21-2 Payload Configuration Parameter	Partial Loading of 20 Intact Fuel Assemblies Limit/Specification
Payload Description:	≤ 20 PWR fuel assemblies or PWR fuel assemblies with control components, as defined in Table 2.1-4. The center storage location shall not contain a fuel assembly. If less than 20 fuel assemblies are loaded, a dummy fuel assembly shall be placed into each empty CANISTER basket guide tube (except for the center guide tube). Each dummy fuel assembly shall be the approximate weight and size of the actual fuel being loaded.
Maximum Weight per Assembly	≤ 1,680 pounds
Heat Load Limit per Assembly:	1.05 kW
Cladding Material/Condition:	Intact zircaloy-clad fuel assemblies with no known or suspected cladding defects greater than hairline cracks or pinhole leaks. Partial fuel assemblies, i.e., fuel assemblies from which fuel rods are missing, must not be loaded into the CANISTER unless dummy fuel rods are inserted into the assembly in the locations of the missing rods. The dummy fuel rods shall displace an amount of water equal to that displaced by the original fuel rods.
Initial Enrichment:	The maximum acceptable enrichment shall not exceed the enrichments defined in Table 2.1-4.
Burnup:	≤ 60,000 MWd/MTU.(1, 2)
Cooling Time:	The minimum acceptable cooling time varies by fuel assembly class and enrichment, as a function of burnup; and is also dependent on the total cobalt content of the fuel and control components. The effects of the maximum acceptable decay heat, initial uranium content, and gamma and neutron sources are incorporated into the minimum cooling time determination. Fuel assemblies shall not be stored with less than the minimum acceptable cooling time indicated in Tables 2.1-7 and 2.1-8.

Notes:
(1) The exposure (burnup) of any inserted control component must not exceed that of the host assembly.
(2) For burnups exceeding 45,000 MWd/MTU, cladding oxide layer thickness is limited to 70 Fm, to be determined in accordance with TS 5.3.7.

Table 2.1-3
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-1 (7 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-1 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
B&W 15x15[8]	B&W 15x15 Mark B	471	#4.7	208	0.43	0.0265	0.37	0.568	2.00	144	W21-1-B	W21-1-B
	B&W 15x15 Mark B2											
	B&W 15x15 Mark B3						0.3686					
	B&W 15x15 Mark B4						0.3675					
	B&W 15x15 Mark B4Z						0.3686				W21-1-A	W21-1-A
	B&W 15x15 Mark B5										W21-1-B	W21-1-B
	B&W 15x15 Mark B5Z										W21-1-A	W21-1-A
	B&W 15x15 Mark B6											

Table 2.1-3
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-1 (7 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-1 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
B&W 15x15[8] (cont.)	B&W 15x15 Mark B7	471	#4.7	208	0.43	0.0265	0.3686	0.568	2.00	144	W21-1-A	W21-1-A
	B&W 15x15 Mark B8											
	Other[9]										W21-1-B	W21-1-B
B&W 17x17	B&W 17x17 Mark C	460	#4.6	264	0.377	0.022	0.3232	0.502	1.97	143	W21-1-B	W21-1-B
	Other[9]											
CE 14x14	CE 14x14	450	#5.0	176	0.440	0.026	0.3795	0.58	3.625	136.7/ 150	W21-1-A	W21-1-B
	CE 14x14 Maine Yankee						0.3759			136.7		
	CE 14x14 Westinghouse						0.3805		2.75			
	CE 14x14 ANF					0.031	0.37	0.58	2.68	127.99	W21-1-A	W21-1-A

Table 2.1-3
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-1 (7 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-1 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
CE 14x14 (cont.)	CE 14x14 St. Lucie 1	450	#5.0	176	0.440	0.026	0.3795	0.568	3.625	136.7	W21-1-A	W21-1-B
	Other[9]											
CE 16x16	CE 16x16	450	#5.0	236	0.382	0.025	0.325	0.506	3.81	136.7	W21-1-A	W21-1-B
	Other[9]											
CE 16x16 System 80	CE System 80	450	#5.0	236	0.382	0.025	0.325	0.506	3.81/ 4.31	150	W21-1-A	W21-1-B
	Other[9]											
WE 14x14	WE 14x14 STD	450	#5.0	179	0.422	0.0243	0.3659	0.556	2.74	144	W21-1-B	W21-1-B
	WE 14x14 LOPAR											
	WE 14x14 OFA				0.4	0.0243	0.3444				W21-1-A	
	WE 14x14 top rod											W21-1-A

Table 2.1-3
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-1 (7 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-1 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
WE 14x14 (cont.)	WE 14x14 B&W	450	#5.0	179	0.426	0.031	0.3565	0.556	N/A	144	W21-1-B	W21-1-B
	WE 14x14 ANF				0.417	0.0295	0.3505				W21-1-A	W21-1-A
	Other[9]										W21-1-B	W21-1-B
WE 15x15	WE 15x15 STD	471	#4.7	204	0.422	0.0243	0.3659	0.563	2.74	144	W21-1-B	W21-1-B
	WE 15x15 LOPAR											
	WE 15x15 OFA										W21-1-A	
	WE 15x15 B&W	450			0.42	0.024	0.3671		N/A		W21-1-B	
	Other[9]											
	WE 15x15 ANF		#4.9		0.424	0.03	0.3565				W21-1-A	W21-1-A
	Other[9]											
WE 17x17	WE 17x17 LOPAR	471	#4.7	264	0.374	0.0225	0.3225	0.496	2.383	144	W21-1-B	W21-1-B

Table 2.1-3
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-1 (7 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-1 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
	WE 17x17 B&W	450				0.024	0.3195		N/A		W21-1-A	
	Other[9]										W21-1-B	
	WE 17x17 OFA		#4.6		0.36	0.0225	0.3088		2.383		W21-1-A	
	WE 17x17 ANF					0.025	0.303		N/A			
	Other[9]											
Fort Calhoun	CE 14x14 Fort Calhoun	450	#5.0	176	0.44	0.026	0.3765	0.58	3.17	128	W21-1-A	W21-1-B
	Other[9]											
Palisades	CE 15x15 Palisades	450	#5.0	208-216	0.4135	0.024	0.35	0.55	2.4	132.6	W21-1-A	W21-1-B
	ANF 15x15 Palisades											
	Other[9]											

Table 2.1-3
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-1 (7 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-1 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
St. Lucie 2	CE 16x16 St. Lucie 2	450	#5.0	236	0.382	0.025	0.325	0.5063	3.81	136.7	W21-1-A	W21-1-B
	Other[9]											
Yankee Rowe	CE 15x16 Yankee Rowe	450	#5.0	231	0.3691	0.026	0.3105	0.472	7.19	91	W21-1-A	W21-1-A
	ANF 15x16 Yankee Rowe				0.365	0.024			7.44			
	Other[9]											
	UNC 15x16 Yankee Rowe			237				0.468	7.19		W21-1-B	W21-1-B
	Other[9]											

Table 2.1-3 Notes:

(1) Assembly Class is defined per EIA Spent Fuel Discharge Report.[2]

(2) Although fuel rods may contain burnable poison material such as Gd_2O_3, no credit is taken for this material. The rod enrichment is simply the initial UO_2, and any burnable absorbers are ignored.

(3) Any number of fuel rods may be replaced by zircaloy or stainless steel dummy pins, or by poison pins, as long as the replacement pin displaces as much water as the original fuel rod.

(4) Empty locations may contain nothing, hollow zircaloy or stainless rods (or rod clusters), solid zircaloy or stainless rods (or rod clusters), or poison rods (or rod clusters).

(5) Clad thickness is the as-designed fuel cladding thickness.

(6) The "Standard" table includes fuel assemblies with no control components or components with negligible core region cobalt activation. These include thimble plugs, control rod assemblies, and zircaloy clad burnable poison rod assemblies (BPRAs) and axial power shaping rod assemblies (APSRAs).

(7) The "Limiting" table includes fuel assemblies containing control components with potentially significant cobalt activation. These include neutron source assemblies, and stainless steel clad BPRAs and APSRAs.

(8) Gray APSRAs for B&W 15x15 fuel class are not qualified for storage at this time.

(9) Other fuel assemblies that meet the defined parameters are qualified for storage.

[2]Energy Information Administration, Spent Nuclear Fuel Discharges from U.S. Reactors 1993, U.S. Department of Energy, 1995.

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
B&W 15x15[8]	B&W 15x15 Mark B	471	#5.0	208	0.43	0.0265	0.37	0.568	2.00	144	W21-2-B	W21-2-B
	B&W 15x15 Mark B2											
	B&W 15x15 Mark B3						0.3686					
	B&W 15x15 Mark B4						0.3675					
	B&W 15x15 Mark B4Z						0.3686				W21-2-A	W21-2-A
	B&W 15x15 Mark B5										W21-2-B	W21-2-B
	B&W 15x15 Mark B5Z										W21-2-A	W21-2-A
	B&W 15x15 Mark B6											

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
B&W 15x15[8] (cont.)	B&W 15x15 Mark B7	471	#5.0	208	0.43	0.0265	0.3686	0.568	2.00	144	W21-2-A	W21-2-A
	B&W 15x15 Mark B8											
	Other[9]										W21-2-B	W21-2-B
B&W 17x17	B&W 17x17 Mark C	460	#4.9	264	0.377	0.022	0.3232	0.502	1.97	143	W21-2-B	W21-2-B
	Other[9]											
CE 14x14	CE 14x14	450	#5.0	176	0.440	0.026	0.3795	0.58	3.625	136.7/ 150	W21-2-A	W21-2-B
	CE 14x14 Maine Yankee						0.3759			136.7		
	CE 14x14 Westinghouse						0.3805		2.75			

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
CE 14x14 (cont.)	CE 14x14 ANF	450	#5.0	176	0.440	0.026	0.37	0.58	2.68	127.99	W21-2-A	W21-2-A
	CE 14x14 St. Lucie 1					0.026	0.3795	0.568	3.625	136.7		W21-2-B
	Other[9]											
CE 16x16	CE 16x16	450	#5.0	236	0.382	0.025	0.325	0.506	3.81	136.7	W21-2-A	W21-2-B
	Other[9]											
CE 16x16 System 80	CE System 80	450	#5.0	236	0.382	0.025	0.325	0.506	3.81/ 4.31	150	W21-2-A	W21-2-B
	Other[9]											
WE 14x14	WE 14x14 STD	450	#5.0	179	0.422	0.0243	0.3659	0.556	2.74	144	W21-2-B	W21-2-B
	WE 14x14 LOPAR											

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
WE 14x14 (cont.)	WE 14x14 OFA	450	#5.0	179	0.4	0.0243	0.3444	0.556	2.74	144	W21-2-A	W21-2-A
	WE 14x14 top rod											
	WE 14x14 B&W				0.426	0.031	0.3565		N/A		W21-2-B	W21-2-B
	WE 14x14 ANF				0.417	0.0295	0.3505				W21-2-A	W21-2-A
	Other[9]										W21-2-B	W21-2-B
WE 15x15	WE 15x15 STD	471	#5.0	204	0.422	0.0243	0.3659	0.563	2.74	144	W21-2-B	W21-2-B
	WE 15x15 LOPAR											
	WE 15x15 OFA										W21-2-A	

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
WE 15x15 (cont.)	WE 15x15 B&W	450	#5.0	204	0.42	0.024	0.3671	0.563	N/A	144	W21-2-B	W21-2-B
	Other[9]											
	WE 15x15 ANF				0.424	0.03	0.3565				W21-2-A	W21-2-A
	Other[9]											
WE 17x17	WE 17x17 LOPAR	471	#5.0	264	0.374	0.0225	0.3225	0.496	2.383	144	W21-2-B	W21-2-B
	WE 17x17 B&W	450				0.024	0.3195		N/A		W21-2-A	
	Other[9]										W21-2-B	
	WE 17x17 OFA		#4.9		0.36	0.0225	0.3088		2.383		W21-2-A	
	Other[9]					0.025	0.303		N/A			

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
WE 17x17 (cont.)	WE 17x17 ANF	450	#5.0	264	0.36	0.025	0.303	0.496	N/A	144	W21-2-A	W21-2-B
	Other[9]											
Fort Calhoun	CE 14x14 Fort Calhoun	450	#5.0	176	0.44	0.026	0.3765	0.58	3.17	128	W21-2-A	W21-2-B
	Other[9]											
Palisades	CE 15x15 Palisades	450	#5.0	208-216	0.4135	0.024	0.35	0.55	2.4	132.6	W21-2-A	W21-2-B
	ANF 15x15 Palisades											
	Other[9]											
St. Lucie 2	CE 16x16 St. Lucie 2	450	#5.0	236	0.382	0.025	0.325	0.5063	3.81	136.7	W21-2-A	W21-2-B
	Other[9]											

Table 2.1-4
Acceptable Fuel Assemblies and Parameters
for Loading Specification W21-2 (8 Pages)

Assembly Class[1]	Assembly Type	Max. Uranium Loading (kg)	W21-2 Initial Enrich. (w/o ^{235}U)[2]	Number of Fuel Rods[3,4]	Min. Clad O.D. (in.)	Min. Clad Thick. (in.)[5]	Min. Pellet O.D. (in.)	Rod Pitch (in.)	Min. Bottom Nozzle (in.)	Max. Active Fuel Length (in.)	Applicable Cooling Table	
											Standard[6]	Limiting[7]
Yankee Rowe	CE 15x16 Yankee Rowe	450	#5.0	231	0.3691	0.026	0.3105	0.472	7.19	91	W21-2-A	W21-2-A
	ANF 15x16 Yankee Rowe				0.365	0.024			7.44			
	Other[9]											
	UNC 15x16 Yankee Rowe			237				0.468	7.19		W21-2-B	W21-2-B
	Other[9]											

Table 2.1-4 Notes:

(1) Assembly Class is defined per EIA Spent Fuel Discharge Report.[3]

(2) Although fuel rods may contain burnable poison material such as Gd_2O_3, no credit is taken for this material. The rod enrichment is simply the initial UO_2, and any burnable absorbers are ignored.

(3) Any number of fuel rods may be replaced by zircaloy or stainless steel dummy pins, or by poison pins, as long as the replacement pin displaces as much water as the original fuel rod.

(4) Empty locations may contain nothing, hollow zircaloy or stainless rods (or rod clusters), solid zircaloy or stainless rods (or rod clusters), or poison rods (or rod clusters).

(5) Clad thickness is the as-designed fuel cladding thickness.

(6) The "Standard" table includes fuel assemblies with no control components or components with negligible core region cobalt activation. These include thimble plugs, control rod assemblies, and zircaloy clad burnable poison rod assemblies (BPRAs) and axial power shaping rod assemblies (APSRAs).

(7) The "Limiting" table includes fuel assemblies containing control components with potentially significant cobalt activation. These include neutron source assemblies, stainless steel clad BPRAs and APSRAs, and stainless steel dummy pins. Neutron source assemblies must also have a negligible residual neutron source (i.e., $<1x10^4$ n/s).

(8) Gray APSRAs for B&W 15x15 fuel class are not qualified for storage at this time.

(9) Other fuel assemblies that meet the defined parameters are qualified for storage.

[3]Energy Information Administration, Spent Nuclear Fuel Discharges from U.S. Reactors 1993, U.S. Department of Energy, 1995.

2.0 Functional and Operating Limits

Table 2.1-5
Fuel Cooling Table W21-1-A

APPLICABILITY:

Canister:	FuelSolutions™ W21-M and W21-T Canisters
Loading Specification:	W21-1 (Table 2.1-1)
Description:	Up to 21 fuel assemblies
SNF Assemblies:	Valid for the SNF assemblies listed in Table 2.1-3
Cobalt Range:	# 11 g in active fuel region (low-cobalt)

QUALIFICATION BASES:

Storage Cask Dose Rate	# 50 mrem/hr
Canister Heat Load	# 22.0 kW/Canister, and # 0.161 kW/inch-Canister

Maximum Burnup (MWD/MTU)[1,3]	Required Minimum Cooling Time (yr.)[1,2] — Minimum Initial Enrichment (w/o ^{235}U)							
	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
15,000	3.3	3.3	3.2	3.2	3.2	3.1	3.1	3.1
20,000	3.7	3.6	3.5	3.5	3.4	3.4	3.4	3.4
25,000	4.0	3.9	3.8	3.7	3.7	3.6	3.6	3.6
30,000	4.9	4.6	4.4	4.2	4.1	4.0	3.9	3.8
32,000	5.2	5.0	4.8	4.6	4.4	4.2	4.1	4.0
34,000	5.5	5.3	5.0	4.8	4.6	4.5	4.3	4.2
36,000	5.9	5.6	5.4	5.1	5.0	4.8	4.6	4.5
38,000	6.4	5.9	5.7	5.5	5.3	5.1	4.9	4.8
40,000	7.1	6.5	6.0	5.7	5.5	5.4	5.2	5.0
42,000	8.0	7.4	6.9	6.4	6.0	5.8	5.6	5.5
44,000	9.1	8.1	7.5	7.0	6.6	6.2	5.9	5.8
46,000	NQ [4]	9.3	8.3	7.7	7.3	6.9	6.5	6.2
48,000	NQ	10.6	9.5	8.6	7.9	7.5	7.2	6.8
50,000	NQ	NQ	10.7	9.7	8.9	8.2	7.7	7.4
52,000	NQ	NQ	12.3	11.0	9.9	9.2	8.6	8.0
54,000	NQ	NQ	NQ	12.7	11.4	10.4	9.6	9.0
56,000	NQ	NQ	NQ	14.5	13.1	11.8	10.8	10.0
58,000	NQ	NQ	NQ	NQ	14.8	13.5	12.2	11.3
60,000	NQ	NQ	NQ	NQ	16.9	15.3	13.9	12.8

2.0 Functional and Operating Limits

Table 2.1-6
Fuel Cooling Table W21-1-B

APPLICABILITY:

Canister:	FuelSolutions™ W21-M and W21-T Canisters
Loading Specification:	W21-1 (Table 2.1-1)
Description:	Up to 21 fuel assemblies
SNF Assemblies:	Valid for the SNF assemblies listed in Table 2.1-3
Cobalt Range:	# 50 g in active fuel region (high-cobalt)

QUALIFICATION BASES:

Storage Cask Dose Rate	# 50 mrem/hr
Canister Heat Load	# 22.0 kW/Canister, and # 0.161 kW/inch-Canister

Maximum Burnup (MWD/MTU)[1,3]	Required Minimum Cooling Time (yr.)[1,2] — Minimum Initial Enrichment (w/o ^{235}U)							
	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
15,000	4.2	4.0	3.9	3.8	3.8	3.8	3.7	3.7
20,000	4.9	4.6	4.5	4.4	4.3	4.2	4.2	4.1
25,000	5.6	5.3	5.1	5.0	4.9	4.8	4.7	4.7
30,000	6.2	6.0	5.5	5.4	5.3	5.2	5.1	5.0
32,000	6.6	6.4	5.7	5.6	5.5	5.4	5.3	5.2
34,000	7.0	6.8	6.0	5.8	5.7	5.6	5.5	5.4
36,000	7.2	7.0	6.2	6.1	5.9	5.8	5.7	5.6
38,000	7.6	7.4	6.6	6.4	6.2	6.0	5.9	5.8
40,000	7.7	7.6	7.4	6.4	6.2	6.0	5.9	5.8
42,000	8.2	8.0	7.9	6.8	6.6	6.5	6.3	6.1
44,000	9.1	8.4	8.2	7.1	6.9	6.8	6.6	6.4
46,000	NQ [4]	9.3	8.3	7.7	7.3	6.9	6.7	6.5
48,000	NQ	10.6	9.5	8.6	7.9	7.5	7.2	6.8
50,000	NQ	NQ	10.7	9.7	8.9	8.2	7.7	7.4
52,000	NQ	NQ	12.3	11.0	9.9	9.2	8.6	8.0
54,000	NQ	NQ	NQ	12.7	11.4	10.4	9.6	9.0
56,000	NQ	NQ	NQ	14.5	13.1	11.8	10.8	10.0
58,000	NQ	NQ	NQ	NQ	14.8	13.5	12.2	11.3
60,000	NQ	NQ	NQ	NQ	16.9	15.3	13.9	12.8

2.0 Functional and Operating Limits

Table 2.1-7
Fuel Cooling Table W21-2-A

APPLICABILITY:

Canister:	FuelSolutions™ W21-M and W21-T Canisters
Loading Specification:	W21-2 (Table 2.1-2)
Description:	Up to 20 fuel assemblies
SNF Assemblies:	Valid for the SNF assemblies listed in Table 2.1-4
Cobalt Range:	# 11 g in active fuel region (low-cobalt)

QUALIFICATION BASES:

Storage Cask Dose Rate	# 50 mrem/hr
Canister Heat Load	# 22.0 kW/Canister, and # 0.161 kW/inch-Canister

Maximum Burnup (MWD/MTU)[1,3]	Required Minimum Cooling Time (yr.)[1,2] — Minimum Initial Enrichment (w/o ^{235}U)							
	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
15,000	3.3	3.3	3.2	3.2	3.2	3.1	3.1	3.1
20,000	3.7	3.6	3.5	3.5	3.4	3.4	3.4	3.4
25,000	4.0	3.9	3.8	3.7	3.7	3.6	3.6	3.6
30,000	4.9	4.6	4.4	4.2	4.1	4.0	3.9	3.8
32,000	5.2	5.0	4.8	4.6	4.4	4.2	4.1	4.0
34,000	5.5	5.3	5.0	4.8	4.6	4.5	4.3	4.2
36,000	5.9	5.6	5.4	5.1	5.0	4.8	4.6	4.5
38,000	6.4	5.9	5.7	5.5	5.3	5.1	4.9	4.8
40,000	7.1	6.5	6.0	5.7	5.5	5.4	5.2	5.0
42,000	8.0	7.4	6.9	6.4	6.0	5.8	5.6	5.5
44,000	9.1	8.1	7.5	7.0	6.6	6.2	5.9	5.8
46,000	NQ [4]	9.3	8.3	7.7	7.3	6.9	6.5	6.2
48,000	NQ	10.6	9.5	8.6	7.9	7.5	7.2	6.8
50,000	NQ	NQ	10.7	9.7	8.9	8.2	7.7	7.4
52,000	NQ	NQ	12.3	11.0	9.9	9.2	8.6	8.0
54,000	NQ	NQ	NQ	12.7	11.4	10.4	9.6	9.0
56,000	NQ	NQ	NQ	14.5	13.1	11.8	10.8	10.0
58,000	NQ	NQ	NQ	NQ	14.8	13.5	12.2	11.3
60,000	NQ	NQ	NQ	NQ	16.9	15.3	13.9	12.8

2.0 Functional and Operating Limits

Table 2.1-8
Fuel Cooling Table W21-2-B

APPLICABILITY:

Canister:	FuelSolutions™ W21-M and W21-T Canisters
Loading Specification:	W21-2 (Table 2.1-2)
Description:	Up to 20 fuel assemblies
SNF Assemblies:	Valid for the SNF assemblies listed in Table 2.1-4
Cobalt Range:	# 50 g in active fuel region (high-cobalt)

QUALIFICATION BASES:

Storage Cask Dose Rate	# 50 mrem/hr
Canister Heat Load	# 22.0 kW/Canister, and # 0.161 kW/inch-Canister

Maximum Burnup (MWD/MTU)[1,3]	Required Minimum Cooling Time (yr.)[1,2] — Minimum Initial Enrichment (w/o ^{235}U)							
	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
15,000	4.2	4.0	3.9	3.8	3.8	3.8	3.7	3.7
20,000	4.9	4.6	4.5	4.4	4.3	4.2	4.2	4.1
25,000	5.6	5.3	5.1	5.0	4.9	4.8	4.7	4.7
30,000	6.2	6.0	5.5	5.4	5.3	5.2	5.1	5.0
32,000	6.6	6.4	5.7	5.6	5.5	5.4	5.3	5.2
34,000	7.0	6.8	6.0	5.8	5.7	5.6	5.5	5.4
36,000	7.2	7.0	6.2	6.1	5.9	5.8	5.7	5.6
38,000	7.6	7.4	6.6	6.4	6.2	6.0	5.9	5.8
40,000	7.7	7.6	7.4	6.4	6.2	6.0	5.9	5.8
42,000	8.2	8.0	7.9	6.8	6.6	6.5	6.3	6.1
44,000	9.1	8.4	8.2	7.1	6.9	6.8	6.6	6.4
46,000	NQ [4]	9.3	8.3	7.7	7.3	6.9	6.7	6.5
48,000	NQ	10.6	9.5	8.6	7.9	7.5	7.2	6.8
50,000	NQ	NQ	10.7	9.7	8.9	8.2	7.7	7.4
52,000	NQ	NQ	12.3	11.0	9.9	9.2	8.6	8.0
54,000	NQ	NQ	NQ	12.7	11.4	10.4	9.6	9.0
56,000	NQ	NQ	NQ	14.5	13.1	11.8	10.8	10.0
58,000	NQ	NQ	NQ	NQ	14.8	13.5	12.2	11.3
60,000	NQ	NQ	NQ	NQ	16.9	15.3	13.9	12.8

2.0 Functional and Operating Limits

Table 2.1-5 through Table 2.1-8 Notes:

(1) Rounding: round up to next highest burnup, round down to next lowest enrichment. Alternatively, more precise cooling times may be obtained by linear interpolation of the cooling time between listed burnup level, enrichment levels, or both.

(2) Enrichments less than 1.5% or greater than the criticality limit presented in Section 6.1 of the FuelSolutions™ W21 Canister Storage FSAR are not qualified.

(3) Burnups greater than 60,000 MWD/MTU are not qualified for storage. Fuel less than 15,000 MWD/MTU is acceptable at or beyond the minimum cooling time indicated for 15,000 MWD/MTU.

(4) Not qualified for storage.

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.
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 W21 Canister Helium Backfill Density

LCO 3.1.1	The CANISTER helium backfill density shall be in the range of 0.0368 g-moles/liter to 0.0395 g-moles/liter (i.e. in the range of 0.0378 ± 0.0010 g-moles/liter to 0.0385 ± 0.0010 g-moles/liter).
APPLICABILITY:	During LOADING OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each CANISTER.

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	CANISTER helium backfill quantity limit is not met.	A.1	Establish CANISTER helium backfill quantity within limit.	48 hours
B.	Required Action and associated Completion Time are not met.	B.1	Remove all fuel assemblies from CANISTER.	30 days

SURVEILLANCE REQUIREMENTS

NOTE

The helium used for backfill shall have a minimum purity of 99.995%.

SURVEILLANCE		FREQUENCY
SR 3.1.1.1	Verify CANISTER helium backfill quantity is within limit.	Within 24 hours after verifying CANISTER cavity vacuum drying pressure is within limit.

3.1 CANISTER INTEGRITY

3.1.2 Canister Vacuum Drying Pressure

See the Storage System Technical Specification for the applicable LCO.

3.1 CANISTER INTEGRITY

3.1.3 Canister Leak Rate

See the Storage System Technical Specification for the applicable LCO.

3.1 CANISTER INTEGRITY

3.1.4 Hydraulic Ram Force During Horizontal Canister Transfer

See the Storage System Technical Specification for the applicable LCO.

3.1 CANISTER INTEGRITY

3.1.5 W21 Canister Vertical Time Limit in Transfer Cask

LCO 3.1.5	For vertical TRANSFER OPERATIONS, the CANISTER transfer out of the TRANSFER CASK shall be completed within 18 hours after draining the annulus water from the TRANSFER CASK. For horizontal TRANSFER OPERATIONS, the movement of the TRANSFER CASK to the horizontal position on the transfer trailer shall be completed within 18 hours after draining the annulus water from the TRANSFER CASK.
APPLICABILITY:	During TRANSFER OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each CANISTER.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. CANISTER time limit in drained annulus TRANSFER CASK is not met.	A.1 Fill annulus with water. AND	8 hours.
	A.2 Maintain filled annulus.	24 hours.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.5.1	Verify TRANSFER CASK operations with CANISTER in vertical orientation and annulus drained are completed within time limit.	Within 18 hours after completion of TRANSFER CASK/ CANISTER annulus draining.

3.2 CANISTER RADIATION PROTECTION

3.2.1 Canister Surface Contamination

See the Storage System Technical Specification for the applicable LCO.

(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

LCO 3.3.2	The inlet and outlet vent screens of a STORAGE CASK with a W21 CANISTER containing fuel assemblies shall be visibly free of blockage or damage. OR The temperature of a STORAGE CASK with a W21 CANISTER containing fuel assemblies, as indicated by the liner thermocouple, shall meet the temperature limit established by the *storage cask periodic monitoring program*.
APPLICABILITY:	During STORAGE OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each STORAGE CASK.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO 3.3.2 not met.	A.1 If vent blockage is identified during visual inspection of vent screens, clear vent screens of blockage.	24 hours
	AND	
	A.2.1 If vent damage is identified during visual inspection of vent screens, remove the damaged vent screen(s).	24 hours
	AND	
	A.2.2.1 If vent damage significantly reduces flow area but does not increase access to vent channels, repair or replace the damaged vent screen(s).	24 hours
	OR (continued)	

3.3.2 Storage Cask Periodic Monitoring

CONDITION	REQUIRED ACTION	COMPLETION TIME
	A.2.2.2 If vent damage increases access to vent channel, perform a visual inspection of the vent channel, clear any debris or obstructions found, and repair or replace the damaged vent screen(s).	24 hours
	AND	
	A.2.3 Attach the repaired or replacement vent screen(s) to the STORAGE CASK.	24 hours
	OR	
	A.3.1 If the liner thermocouple temperature exceeds the allowable temperature limit, check the STORAGE CASK inlet and outlet vent screens for blockage or damage.	24 hours
	AND	
	A.3.2.1 If vents are blocked or damaged, perform ACTIONS A.1 and A.2, as required.	In accordance with ACTIONS A.1 and A.2.
	OR	
	A.3.2.2.1 If vents are not blocked or damaged, check the liner thermocouple and related instrumentation to assure it is functioning properly.	24 hours
	AND	
	A.3.2.2.2 Repair or replace thermocouple and related instrumentation as necessary.	48 hours
	AND (continued)	
	A.3.3 Verify STORAGE CASK	72 hours

3.3.2 Storage Cask Periodic Monitoring

CONDITION	REQUIRED ACTION	COMPLETION TIME
	temperature returns to within the the local concrete long-term temperature limit of 200EF. AND	
	A.3.4 Verify STORAGE CASK temperature returns to within the applicable temperature limit from the *storage cask periodic monitoring program*.	192 hours
B. Required Actions and associated Completion Times are not met.	B.1 Initiate actions to cool the cask to within the limit. AND	96 hours
	B.2.1 Visually inspect the interior of the STORAGE CASK for ventilation obstructions using remote inspection tools or by temporarily removing the STORAGE CASK top ocver. AND	96 hours
	B.2.2.1 Remove ventilation obstructions. AND	96 hours
	B.2.2.2 Verify STORAGE CASK temperature returns to within local concrete long-term temperature limit of 200EF. AND	96 hours
	B.2.2.3 Verify STORAGE CASK temperature returns to within the applicable limit from the *storage cask periodic monitoring program*. OR (continued)	270 days

3.3.2 Storage Cask Periodic Monitoring

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.2.3.1 Return CANISTER to TRANSFER CASK. AND	30 days
	B.3.3.2 Return CANISTER to repaired or replacement STORAGE CASK.	270 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.2.1	Visually inspect all four inlet screens and all four outlet screens for each loaded STORAGE CASK. OR Verify that the STORAGE CASK temperatures are within limit NOTE STORAGE CASK temperatures are expected to vary slightly between successive measurements due to changes in the ambient temperature. This is acceptable as long as the temperatures remain within the specified limit.	Based on *storage cask periodic monitoring program*.

3.3 STORAGE CASK INTEGRITY

3.3.3 Storage Cask Temperatures During Horizontal Transfer

LCO 3.3.3	The measured temperature of a STORAGE CASK with a W21 CANISTER containing fuel assemblies, as indicated by the liner thermocouple, shall not exceed 190EF (88EC).
APPLICABILITY:	During TRANSFER OPERATIONS.

ACTIONS

NOTE

Separate Condition entry is allowed for each STORAGE CASK.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. STORAGE CASK concrete temperature limit is not met.	A.1 Transfer the CANISTER into the TRANSFER CASK	24 hours
B. Required Action A.1 and associated Completion Times are not met.	B.1 Inspect the STORAGE CASK for damage. AND	5 days
	B.2.1 If no damage, transfer CANISTER to STORAGE CASK. OR	7 days
	B.2.2 If damaged, transfer CANISTER to new STORAGE CASK.	21 days
C. Required Actions B.1 and B.2-1, or B.1 and B.2.2, and associated Completion Time are not met.	C.1 Return CANISTER to TRANSFER CASK. AND	30 days
	C.2 Return CANISTER to repaired or replacement STORAGE CASK.	270 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.3.1	After the STORAGE CASK is downended to the horizontal orientation with a CANISTER loaded with SNF inside, monitor and record STORAGE CASK concrete temperature as indicated by the STORAGE CASK liner thermocouple.	30 minutes

3.4 TRANSFER CASK INTEGRITY

3.4.1 Transfer Cask Structural Shell Temperature

See the Storage System Technical Specification for the applicable LCO.

3.5 TRANSFER CASK RADIATION PROTECTION

3.5.1 Transfer Cask Surface Contamination

See the Storage System Technical Specification for the applicable LCO.

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

See the Storage System Technical Specification Section 4.1.1.1 for discussion of STORAGE CASK structural performance features.

4.1.1.2 Codes and Standards

See the Storage System Technical Specification Section 4.1.1.2 for discussion of codes and standards applicable to the STORAGE CASK.

4.1.1.3 Fabrication Exceptions to Codes, Standards, and Criteria

See the Storage System Technical Specification Section 4.1.1.3 for discussion of exceptions to codes, standards, and criteria.

4.1.2 Transfer Cask

4.1.2.1 Structural Performance

See the Storage System Technical Specification Section 4.1.2.1 for discussion of TRANSFER CASK structural performance features.

4.1.2.2 Codes and Standards

See the Storage System Technical Specification Section 4.1.2.2 for discussion of codes and standards applicable to the TRANSFER CASK.

4.1.2.3 Fabrication Exceptions to Codes, Standards, and Criteria

See the Storage System Technical Specification Section 4.1.2.3 for discussion of exceptions to codes, standards, and criteria.

4.1.3 Canister

4.1.3.1 Criticality

The design of the W21 CANISTER, including spatial constraints on adjacent assemblies (minimum basket cell opening of 8.90 inches square) and the boron content of the basket neutron absorber material (minimum areal density equal to 20 mg $^{10}B/cm^2$) shall assure that fuel assemblies are maintained in a subcritical condition with a k_{eff} less than 0.95 under all conditions of operation.

4.0 Design Features

4.1.3.2 Structural Performance

The CANISTER has been evaluated for a side drop resulting in a lateral gravitational (*g*) loading of 60 *g* and an end drop resulting in an axial gravitational loading of 50 *g*.

The maximum weight of a loaded, dried, and sealed W21 CANISTER is 85,000 pounds. The maximum CANISTER weight includes fuel assembly spacers, where applicable.

The W21 CANISTER thermal rating of 25.1 kW is determined by the minimum heat load qualification in the STORAGE and TRANSFER CASKS.

4.1.3.3 Codes and Standards

The FuelSolutions™ W21 CANISTER shell structural components are designed in accordance with Subsection NB of the ASME Code, and the basket structural components are designed in accordance with Subsection NG of the ASME Code. Exceptions to the code are listed in Table 4.1-1.

4.1.3.4 Fabrication Exceptions to Codes, Standards, and Criteria

Proposed alternatives to Subsections NB and NG of the ASME Code, including exceptions allowed by Section 4.1.3.3, 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.

4.2 Storage Pad

Constraints on the storage pad are discussed in Section 4.2 of the Storage System Technical Specification.

4.3 Site Specific Parameters and Analyses

See the Storage System Technical Specification Section 4.3 for discussion of site specific parameters and analyses.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
Section III, Subsection NCA (applicable to both Canister and Basket):			
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™ Canisters, 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 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 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.
4	**NCA-1220, "Materials"**	Not all non-pressure retaining materials specified in this FuelSolutions™ Canister Storage FSAR are listed as ASME Section III materials.	FuelSolutions™ Canisters are purchased, identified, controlled, and manufactured using a graded quality approach in accordance with the NRC-approved BFS QA Program based on NQA-1, NRC Regulatory Guide 7.10, and NUREG/CR-6407 criteria.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
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.
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.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
9	**NCA-3200, "Owner's Responsibilities"**	An Owner's responsibilities under the 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.
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.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
15	**NCA-3800, "Metallic Material Organization's Quality System Program"**	Materials for a FuelSolutions™ canister may be purchased from suppliers that are not certified per the requirements of NCA-3800.	Material suppliers are qualified per NCA-3800 or the NRC-approved BFS QA Program based on the requirements of NQA-1, NRC Regulatory Guide 7.10, and NUREG/CR-6407 criteria.
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 QA requirements do not apply.	See Item 4.
18	**NCA-5000, "Authorized Inspection"**	The manufacturing or operation of the FuelSolutions™ SFMS does not use an Authorized Inspection Agency.	An Authorized Inspection Agency is not typically used in the manufacturing or operation of components licensed under 10CFR72.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
19	**NCA-8000, "Certificates of Authorization, Nameplates, Code Symbol Stamping, and Data Reports"**	The FuelSolutions™ SFMS does not use an ASME Code Certificate of Authorization, a Code Symbol Stamp, or a Data Report.	An ASME Code Certificate of Authorization, a Code Symbol Stamp, or a Data Report are not typically required for components licensed under 10CFR72. Nameplate information is provided on each FuelSolutions™ canister.
Section III, Subsection NB (applicable to Canister):			
20	**NB-1130, "Boundary of Components:"** "The Design Specification shall define the boundary of a component to which piping or another component is attached."	See Item 6.	See Item 6.
21	**NB-1132.2, "Jurisdictional Boundary:"** "The jurisdictional boundary between a pressure-retaining component and an attachment defined in the Design Specification shall not be any closer to the pressure-retaining portion of the component than as defined in (a) through (g) below…"	See Item 6.	See Item 6.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
22	**NB-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. …Any special requirement shall be specified in the Design Specifications (NCA-3252 and NB-3124)…"	See Item 2.	See Item 2.
23	**NB-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.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
24	**NB-3113, "Service Conditions:"** "Each service condition to which the components may be subjected shall be classified in accordance with NCA-2142 and Service Limits (NCA-2142.4(b)) designated in the Design Specifications in such detail as will provide a complete basis for design, construction, and inspection in accordance with this Article…"	See Item 2.	See Item 2.
25	**NB-3134, "Leak Tightness:"** "Where a system leak tightness greater than that required or demonstrated by a hydrostatic test is required, the leak tightness requirements for each component shall be set forth in the Design Specifications."	See Item 2.	See Item 2.
26	**NB-3220, "Stress Limits for Other Than Bolts"**	This section makes a number of references to an ASME Code Design Specification. See Item 2.	See Item 2.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
27	**NB-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 this Article."	The FuelSolutions™ SFMS does not use an ASME Code Symbol Stamp or a Data Report.	An ASME Code Symbol Stamp or Data Report are not typically required for components licensed under 10CFR72. Also see Item 15.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
28	**NB-4243, "Category C Weld Joints in Vessels and Similar Weld Joints in Other Components:"** "Category C weld joints in vessels and similar weld joints in other components shall be full penetration joints…Either a butt welded joint or a full penetration corner joint as shown in Fig. NB-4243-1 shall be used."	The FuelSolutions™ canister top end closure employs the following cover-to-shell weld types: 1. Top inner cover - a single-sided partial penetration weld. 2. Top outer cover - a single-sided partial penetration weld.	The FuelSolutions™ canister top end closure employs multi-pass, redundant welds subjected to multi-level liquid penetrant examinations and a combined pneumatic pressure and helium leak rate test at a hydrostatic test pressure to assure structural integrity and leak tightness. The design of the inner closure weld incorporates a stress-reduction factor of 0.9 to account for use of multi-pass PT examination and helium leak testing. The design of the outer closure weld complies with ISG-4. The examination of the inner and outer closure plate welds complies with ISG-4.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
29	**NB-5231, "General Requirements:"** "(a) Category C full penetration butt welded joints in vessels and similar welded joints in other components shall be examined by the radiographic and either liquid penetrant or magnetic particle method."	The FuelSolutions™ canister top end closures are not radiographically examined.	See Item 28.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
30	**NB-6112, "Pneumatic Testing:"** "A pneumatic test in accordance with NB-6300 may be substituted for the hydrostatic test when permitted by NB-6112.1(a)." **NB-6112.1, "Pneumatic Test Limitations:"** "(a) A pneumatic test may be used in lieu of a hydrostatic test only when any of the following conditions exists: 1. when components, appurtenances, or systems are so designed or supported that they cannot safely be filled with liquid; 2. when components, appurtenances, or systems which are not readily dried are to be used in services where traces of the testing medium cannot be tolerated. (b) A pneumatic test at a pressure not to exceed 25% of the Design Pressure may be applied, prior to either a hydrostatic or a pneumatic test, as a means of locating leaks."	The FuelSolutions™ Canisters employ a combined pneumatic pressure and helium leak rate test at a hydrostatic test pressure to assure structural integrity and leak tightness.	Because a dry SNF assembly storage canister is a 10CFR72 licensed component requiring a helium leak rate test, the combination of this leak rate test with a pneumatic pressure test at a hydrostatic test pressure is operationally efficient and consistent with ALARA principles, while still being very conservative due to the molecular size of the testing medium and the use of helium leak rate vs. visual examination acceptance criteria.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
31	**NB-6200, "Hydrostatic Tests"**	See Item 30.	See Item 30.
32	**NB-7000, "Overpressure Protection"**	A FuelSolutions™ canister is not designed to include an overpressure protection device.	By their very nature, Canisters and casks designed to dry store SNF assemblies are licensed without any type of overpressure protection device or vent path of any kind.
33	**NB-8000, "Nameplates, Stamping, and Reports"**	The FuelSolutions™ SFMS does not use an ASME Code Symbol Stamp or a Data Report.	An ASME Code Symbol Stamp or a Data Report are not typically required for components licensed under 10CFR72. Nameplate information is provided on each FuelSolutions™ canister.
Section III, Subsection NG (applicable to Basket):			
34	**NG-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 2.	See Item 2.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
35	**NG-2330, "Test Requirements and Acceptance Standards"**	FuelSolutions™ canister basket material is not impact tested to the requirements of NG-2330.	Canister basket is licensed for storage and transportation, and therefore materials are impact tested in accordance with NRC criteria provided in Regulatory Guide 7.11 and NUREG/CR-1815 for Category II materials.
36	**NG-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.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
37	**NG-3113, "Service Loadings:"** "Each loading to which the structure may be subjected shall be classified in accordance with NCA-2142 and Service Limits (NCA-2142.4(b)) designated in the Design Specifications in such detail as will provide a complete basis for design, construction, and inspection in accordance with this Article…"	See Item 2.	See Item 2.
38	**NG-3220, "Stress Limits for Other Than Threaded Structural Fasteners"**	This section makes a number of references to an ASME Code Design Specification. See Item 2.	See Item 2.
39	**NG-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 NG-2000 and that the fabrication or installation complies with the requirements of this Article."	The FuelSolutions™ SFMS does not use an ASME Code Symbol Stamp or a Data Report.	An ASME Code Symbol Stamp or Data Report are not typically required for components licensed under 10CFR72. Also see Item 15.

Table 4.1-1
FuelSolutions™ W21 Canister ASME Code Requirements Compliance Summary (16 pages)

Item	ASME Code Requirement	Issue	Alternative Compliance Basis
40	**NG-8000, "Nameplates, Stamping, and Reports"**	The FuelSolutions™ SFMS does not use an ASME Code Symbol Stamp or a Data Report.	An ASME Code Symbol Stamp or a Data Report are not typically required for components licensed under 10CFR72. Nameplate information is provided on each FuelSolutions™ canister.

5.0 ADMINISTRATIVE CONTROLS

5.1 Training Modules

See the Storage System Technical Specification for the applicable information.

5.2 Preoperational Testing and Training Exercises

See the Storage System Technical Specification for the applicable information.

5.3 Programs

5.3.1-5.3.5

See the Storage System Technical Specification for the applicable information.

5.3.6 Vacuum Drying Program

The FuelSolutions™ W21 CANISTER has been evaluated for allowable fuel cladding temperature during LOADING and STORAGE OPERATIONS. During LOADING OPERATIONS, the fuel cladding temperature is limited to 400EC to assure cladding integrity.

This program shall establish administrative controls and procedures to assure that the spent fuel cladding does not exceed the temperature limit during LOADING OPERATIONS. For a CANISTER loaded with fuel with a total heat load of 22.0 kW, the total vacuum drying cycle shall be limited to 12 hours. If the vacuum drying LCO 3.1.2 has not been satisfied, the CANISTER shall be backfilled with helium for 4 hours, vacuum dried for 8 hours, backfilled for 4 hours, etc., until the LCO is met.

For a heat load of 17.5 kW or lower, there is no time limit on the initial vacuum drying cycle. For heat loads greater than 17.5 kW but less than 22.0 kW, the program shall either use the 22.0 kW requirements, or establish suitable time limits to maintain the cladding temperature to less than or equal to 400EC for the specific CANISTER heat load.

5.3.7 Cladding Oxide Thickness Measurement Program

For fuel with a burnup exceeding 45 GWd/MTU, it is necessary to verify that cladding oxide layer thickness for fuel assemblies to be stored does not exceed 70 Fm.

This program shall establish administrative controls and procedures to verify oxide layer thickness by measurement of a statistical sample of limiting fuel assemblies.

5.3.8 Storage Cask Periodic Monitoring Program |

See the STORAGE CASK Technical Specifications for the applicable information. |

5.4 Special Requirements for First System in Place

The heat transfer characteristics of the cask system will be recorded by temperature measurements of the first STORAGE CASK placed in service with a heat load equal to or greater than 10kW. In accordance with 10CFR72.4, a letter report summarizing the results of the measurements shall be submitted to the NRC.

For each cask subsequently loaded with a higher heat load (up to the 22.0 kW limit), the calculation and measured temperature data shall be reported to the NRC at every 2 kW increase. The calculation and comparison need not be reported to the NRC for STORAGE CASKS that are subsequently loaded with lesser loads then the latest reported case.

Cask users may satisfy these requirements by referencing validation test reports submitted to the NRC by other users.