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APPENDIX B

TECHNICAL SPECIFICATIONS FOR THE STANDARDIZED NUHOMS® HORIZONTAL
MODULAR STORAGE SYSTEM

DOCKET 72-1004

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1.0 USE AND APPLICATION

1.1 Definitions

----- NOTE -----

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

<u>Term</u>	<u>Definition</u>
ACTIONS	ACTIONS shall be that part of a Specification that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
HORIZONTAL STORAGE MODULE (HSM)	The HSM (Standardized HSM, HSM-H, high seismic option for HSM-H or other models enveloped by these designs) is a reinforced concrete structure for storage of a loaded DSC at a spent fuel storage installation. e.g., Standardized HSM includes HSM Model 80, Model 102, Model 152 or Model 202 as described in the Updated Final Safety Analysis Report (UFSAR). The generic term "HSM-H" refers to HSM-H or high seismic option for HSM-H except where a specific HSM-H configuration is called out.
DRY SHIELDED CANISTER (DSC)	A DSC (Model 24P, 52B, 61BT, 32PT, 24PHB, 24PTH, 61BTH, 32PTH1, 69BTH, 37PTH or other models enveloped by these designs) is a welded vessel that provides confinement of fuel assemblies in an inert atmosphere.
INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)	A complex designed and constructed for the interim storage of spent nuclear fuel, solid reactor-related GTCC waste, and other radioactive materials associated with spent fuel and reactor-related GTCC waste storage.
INTACT FUEL ASSEMBLY	INTACT FUEL ASSEMBLY is defined as an assembly containing fuel rods with no known or suspected cladding defects greater than hairline cracks or pin hole leaks. Non-cladding material damage is acceptable to the extent that the fuel assembly can be handled by normal means and the fuel assembly is retrievable after all normal and off-normal conditions.
DAMAGED FUEL ASSEMBLY, FAILED FUEL ASSEMBLY	The definitions for damaged or failed fuel assemblies are in the fuel specification tables for each DSC referred to in Technical Specification 2.1.

(continued)

1.1 Definitions

LOADING OPERATIONS	LOADING OPERATIONS include all licensed activities on a DSC in a TC while it is being loaded with fuel assemblies. LOADING OPERATIONS begin when the first fuel assembly is placed in the DSC and end when the TC is ready for TRANSFER OPERATIONS (i.e., when the cask is in a horizontal position on the trailer). The placement of the Outer Top Trailer Shielding onto the OS197L TC is considered part of the LOADING OPERATIONS. LOADING OPERATIONS do not include DSC transfer between the TC and the HSM.
STORAGE OPERATIONS	STORAGE OPERATIONS include all licensed activities that are performed at the ISFSI while a DSC containing fuel assemblies is located in an HSM on the storage pad within the ISFSI perimeter. STORAGE OPERATIONS do not include DSC transfer between the TC and the HSM.
TRANSFER CASK (TC)	The TC (Standardized TC, OS197, OS197H, OS197L, OS197FC, OS197FC-B, OS197HFC, OS197HFC-B, OS200, OS200FC TC) consists of a licensed NUHOMS® onsite transfer cask.
TRANSFER OPERATIONS	TRANSFER OPERATIONS include all licensed activities involving the movement of a TC loaded with a DSC containing fuel assemblies. TRANSFER OPERATIONS begin after the TC has been placed horizontal on the transfer trailer (and for the OS197L, the supplemental trailer shielding has been put in place) ready for TRANSFER OPERATIONS and end when the DSC is at its destination and no longer horizontal on the transfer trailer. TRANSFER OPERATIONS include transfer of a DSC between the TC and the HSM.
UNLOADING OPERATIONS	UNLOADING OPERATIONS include all licensed activities on a DSC to unload fuel assemblies. UNLOADING OPERATIONS begin when the TC is no longer horizontal on the transfer trailer and end when the last fuel assembly has been removed from the DSC. UNLOADING OPERATIONS do not include DSC transfer between the TC and the HSM.
FUEL BUILDING	The FUEL BUILDING is the site-specific area or a facility where the LOADING OPERATIONS take place.
BLEU FUEL MATERIAL	Blended Low Enriched Uranium (BLEU) fuel material is identical to UO ₂ fuel material except for the presence of higher cobalt impurity.

1.2 Logical Connectors

PURPOSE

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

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

BACKGROUND

Several levels of logic may be used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentions of the logical connectors.

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

EXAMPLES

The following examples illustrate the use of logical connectors:

EXAMPLE 1.2-1

ACTIONS

CONDITION		REQUIRED ACTION	COMPLETION TIME
A.	LCO (Limiting Condition for Operation) not met.	A.1 Verify...	
		<u>AND</u> A.2 Restore...	

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

(continued)

1.2 Logical Connectors

EXAMPLES (continued)

EXAMPLE 1.2-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. LCO not met.	A.1 Stop... <u>OR</u> A.2 A.2.1 Verify... <u>AND</u> A.2.2 A.2.2.1 Reduce... <u>OR</u> A.2.2.2 Perform... <u>OR</u> 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.

1.3 Completion Times

PURPOSE	The purpose of this section is to establish the Completion Times 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 are not met. Specified with each stated Condition are Required Action(s) and Completion Time(s).
DESCRIPTION	<p>The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, providing the Cask System is in a specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the Cask System is not within the LCO Applicability.</p> <p>Once a Condition has been entered, subsequent subsystems, components, or variables expressed in the Condition, discovered to be not within limits, will <u>not</u> result in separate entry into the Condition unless specifically stated. The Required Actions of the Condition continue to apply to each additional failure, with Completion Times based on initial entry into the Condition.</p>

(continued)

1.3 Completion Times

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 Complete Action B.1	12 hours
	<u>AND</u>	
	B.2 Complete Action B.2	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

EXAMPLE 1.3-2

ACTIONS

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

When a system is determined to 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.

(continued)

1.3 Completion Times

EXAMPLES (continued)

EXAMPLE 1.3-3

ACTIONS

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

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

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

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

IMMEDIATE COMPLETION TIME

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

1.4 Frequency

PURPOSE	The purpose of this section is to define the proper use and application of Frequency requirements.
DESCRIPTION	<p>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.</p> <p>The "Specified Frequency" is referred to throughout this section and each of the Specifications of Section 3.0, Limiting Condition for Operation (LCO) and 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.</p> <p>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 a SR satisfied, SR 3.0.4 imposes no restriction.</p>

(continued)

1.4 Frequency

EXAMPLES (continued)

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. Commencement 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 stated Frequency is allowed by SR 3.0.2 for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1 (such as when the equipment is determined to 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 facility is in a condition specified in the Applicability of the LCO, the LCO is not met in accordance with SR 3.0.1.

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

(continued)

1.4 Frequency

EXAMPLES
(continued)

EXAMPLE 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Verify flow is within limits.	Once within 12 hours prior to starting activity <u>AND</u> 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 Fuel to be Stored in the Standardized NUHOMS® System

The spent nuclear fuel to be stored in the Standardized NUHOMS® System is specific to each DSC model as listed below and shall meet all the requirements of the applicable Fuel Specification Tables, including the cross-referenced figures and tables listed in their applicable Fuel Specification Tables.

DSC MODEL	Applicable Fuel Specification
24P	Table 1-1a
52B	Table 1-1b
61BT	Table 1-1c and Table 1-1j
32PT	Table 1-1e
24PHB	Table 1-1i
24PTH*	Table 1-1l
61BTH	Table 1-1t
32PTH1	Table 1-1aa
69BTH	Table 1-1gg
37PTH	Table 1-1ll

*Note: The 24PTH-S-LC is only authorized for storage of B&W 15x15 fuel assemblies.

DSC models are listed in the CoC. If the model number has a variant which specifically has certain limitations, then those are specifically called out in the TS. Information concerning the fuel types, dose rate limits, or other technical specifications applies to all variants if they are not explicitly mentioned in the CoC or technical specifications. An example is the 24PTH DSC. In this case, 24PTH is the model number. The 24PTH-S, -L and -S-LC are variants with specific limitations, which are called out in the TS.

2.1.1 Each of the DSC models listed above may be stored inside an HSM model in accordance with LCO 3.1.4.

2.2 Functional and Operating Limits Violations Immediate Actions

If any Functional and Operating Limit of 2.1 is violated, the following actions shall be completed:

2.2.1 The affected fuel assemblies shall be placed in a safe condition.

3.0 LIMITING CONDITION FOR OPERATION (LCO) AND SURVEILLANCE REQUIREMENT (SR) 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	<p>Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met.</p> <p>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.</p>
LCO 3.0.3	Not applicable to a spent fuel storage cask.
LCO 3.0.4	<p>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 DSC.</p> <p>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.</p>
LCO 3.0.5	Not applicable to a spent fuel storage cask.

(continued)

3.0 Limiting Condition for Operation (LCO) and Surveillance Requirement (SR) Applicability

SR 3.0.1	<p>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.</p>
SR 3.0.2	<p>The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.</p> <p>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.</p> <p>Exceptions to this Specification are stated in the individual Specifications.</p>
SR 3.0.3	<p>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.</p> <p>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.</p> <p>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.</p>
SR 3.0.4	<p>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 DSC.</p>

3.1 Fuel Integrity

3.1.1 DSC Bulkwater Removal Medium and Vacuum Drying Pressure

LCO 3.1.1

Medium:

Helium shall be used for all drainage of liquid water from the DSC.

Pressure:

The DSC vacuum drying pressure shall be sustained at or below 3 Torr (3 mm Hg) absolute for a period of at least 30 minutes following evacuation.

APPLICABILITY: During LOADING OPERATIONS but before TRANSFER OPERATIONS.

(continued)

3.1 Fuel Integrity

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><i>Note: Not applicable until SR 3.1.1 is performed.</i></p> <p>A. If the required vacuum pressure cannot be obtained.</p>	A.1	30 days
	A.1.1 Confirm that the vacuum drying system is properly installed. Check and repair the vacuum drying system as necessary.	
	<u>OR</u>	
	A.1.2 Check and repair the seal weld between the inner top cover plate/ top shield plug assembly and the DSC shell.	30 days
	<u>OR</u>	
	A.2 Establish helium pressure of at least 1.0 atm and no greater than 15 psig in the DSC.	30 days
	<u>OR</u>	
	A.3 Flood the DSC with spent fuel pool water or water meeting the requirements of LCO 3.2.1 if applicable submerging all fuel assemblies.	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.1 Verify that the DSC vacuum pressure is less than, or equal to, 3 Torr (3 mm Hg) absolute for at least 30 minutes following evacuation.	Once per DSC, after an acceptable NDE of the inner top cover plate/top shield plug assembly.

(continued)

3.1 Fuel Integrity

3.1.2 DSC Helium Backfill Pressure

- LCO 3.1.2 (a) 24P or 52B DSC helium backfill pressure shall be 2.5 psig \pm 2.5 psig (stable for 30 minutes after filling) after completion of vacuum drying.
- (b) 61BT, 32PT, 24PHB, 24PTH, 61BTH, 32PTH1, 69BTH, or 37PTH DSC helium backfill pressure shall be 2.5 psig \pm 1.0 psig (stable for 30 minutes after filling) after completion of vacuum drying.

APPLICABILITY: During LOADING OPERATIONS but before TRANSFER OPERATIONS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><i>Note: Not applicable until SR 3.1.2 is performed.</i></p> <p>A. The required backfill pressure cannot be obtained or stabilized.</p>	<p>A.1</p> <p>A.1.1 Maintain helium atmosphere in the DSC cavity.</p> <p><u>AND</u></p> <p>A.1.2 Confirm, check and repair or replace as necessary the vacuum drying system, helium source and pressure gauge.</p> <p><u>AND</u></p> <p>A.1.3 Check and repair as necessary the seal weld between the inner top cover plate/top shield plug assembly and the DSC shell.</p> <p><u>OR</u></p> <p>A.2 Establish the DSC helium backfill pressure to within the limit. If pressure exceeds the criterion, release a sufficient quantity of helium to lower the DSC cavity pressure.</p>	<p>14 days</p> <p>14 days</p>

(continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	<u>OR</u> A.3 Flood the DSC with spent fuel pool water or water meeting the requirements of LCO 3.2.1, if applicable, submerging all fuel assemblies.	14 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.2 (a) Verify that the 24P or 52B DSC helium backfill pressure is 2.5 psig \pm 2.5 psig stable for 30 minutes after filling. (b) Verify that the 61BT, 32PT, 24PHB, 24PTH, 61BTH, 32PTH1, 69BTH, or 37PTH DSC helium backfill pressure is 2.5 psig \pm 1 psig stable for 30 minutes after filling.	Once per DSC, after the completion of LCO 3.1.1 actions.

(continued)

3.1 Fuel Integrity

3.1.3 Time Limit for Completion of DSC Transfer (24PTH, 61BTH Type 2, 32PTH1, 69BTH, or 37PTH DSC Only).

LCO 3.1.3

DSC Model	Basket Type	Heat Load Zoning Configuration Number (HLZC)	Time Limit (hours)
24PTH-S or 24PTH-L DSC	1A, 1B or 1C	4	No limit
	1A, 1B or 1C	1, 2, 3, or 6	9.5
	2A, 2B or 2C	1, 2, 3, or 4	25
61BTH, Type 2 DSC Only	NA	1, 2, 3, 4, or 9	No limit
		5, 6, or 8	26
		7 or 10	13
32PTH1 DSC	NA	3	No limit
		1, 5, or 6	13
		2 or 4	14 (Intact Fuel) 10 (Damaged Fuel)
69BTH DSC	NA	1,2,3,4, 5, or 7	13
		6	No limit
37PTH DSC	NA	2	No limit
		3	14

NOTE

The time limit for completion of a DSC transfer is defined as the time elapsed in hours after the initiation of draining of TC/DSC annulus water until the completion of insertion of the DSC into the HSM-H.

APPLICABILITY: During LOADING OPERATIONS AND TRANSFER OPERATIONS.

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p><i>Note: Not applicable until SR 3.1.3 is performed.</i></p> <p>A. The required time limit for completion of a DSC transfer not met.</p>	<p>A.1 If the TC is in the cask handling area in a vertical orientation, fill the TC/DSC annulus with clean water.</p> <p><u>OR</u></p>	2 hours
	<p>A.2 If the TC is in a horizontal orientation on transfer skid, initiate air circulation in the TC/DSC annulus by starting one of the blowers provided on the transfer skid.</p> <p><u>OR</u></p>	2 hours*
	<p>A.3 Return the TC to the cask handling area and follow action A.1 above.</p>	2 hours

**After the blowers are turned off, the time limit for completion of DSC transfer is as indicated in the LCO 3.1.3 table.*

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.3 Verify that the time limit for completion of DSC transfer is met.	Once per DSC, after the completion of LCO 3.1.2 actions or after the initiation of draining of TC/DSC annulus water.

(continued)

3.1 Fuel Integrity

3.1.4 HSM Maximum Air Exit Temperature with a Loaded DSC

LCO 3.1.4 The maximum air temperature rise through the HSM allowed is a function of the decay heat load of the DSC and the HSM model as listed below:

HSM	DSC Model	Maximum Decay Heat Load, kW	Maximum Air Temperature Rise Allowed, °F
Standardized HSM	24P, 52B, 61BT, 32PT, 24PHB, 24PTH-S-LC or 61BTH, Type 1	24.0	100
HSM-H	24PTH-S or 24PTH-L	40.8	100
	24PTH-S-LC	24.0	70
	61BTH, Type 2	31.2	90
	61BTH, Type 1	22.0	70
	32PTH1	40.8	110
	69BTH	35.0	100
	37PTH	30.0	90

APPLICABILITY: During STORAGE OPERATIONS.

NOTE

If a DSC placed within a HSM has a heat load less than the maximum heat load listed above, the maximum air temperature rise allowed shall be determined by a calculation using the same methodology and input documents in the UFSAR. Air temperatures must be measured in such a manner as to obtain representative values of inlet and outlet air temperatures.

(continued)

ACTIONS		
CONDITION	REQUIRED ACTION	COMPLETION TIME
<i>Note: Not applicable until SR 3.1.4 is performed.</i>		
A. The air temperature rise is greater than the above specification.	<p>A.1 Check the inlets and outlets for any blockage and remove blockage if found.</p> <p><u>AND</u></p> <p>A.2 If the inlets or outlets were not blocked, determine if environmental factors are causing the temperature rise to exceed limits. If environmental factors are the cause then take additional measurements and perform analysis to assess the actual performance of the system.</p>	<p>24 hours</p> <p>Determined by the analysis. The analysis completion time is 30 days.</p>
B. Excessive temperatures cause the system to perform in an unacceptable manner and/or the temperatures cannot be controlled to acceptable limits.	<p>B.1 Unload the DSC from the HSM into the TC for a certain amount of time. Verify that condition of HSM interior cavity is not the cause of excessive temperatures and correct if necessary.</p> <p><u>OR</u></p> <p>B.2 Return the TC/DSC the FUEL BUILDING.</p>	<p>Determined by the analysis. The analysis completion time is 30 days.</p> <p>Determined by the analysis. The analysis completion time is 30 days.</p>
SURVEILLANCE REQUIREMENTS		
SURVEILLANCE		FREQUENCY
SR 3.1.4	The temperature rise between the ambient temperature and the vent outlet temperature will be measured and recorded verifying that HSM maximum air temperature rise limit is satisfied.	24 hours after DSC insertion into the HSM. These measurements are repeated on a daily basis after insertion into the HSM or every 24 hours following the occurrence of an accident event, until an equilibrium condition is achieved.

3.1 Fuel Integrity

3.1.5 HSM or HSM-H Thermal Monitoring Program

LCO 3.1.5 *This program provides guidance for temperature measurements that are used to monitor the thermal performance of each HSM.*

----- **NOTE** -----

Note: Only one of the two alternate surveillance activities listed below (a or b) shall be performed for monitoring the HSM or HSM-H thermal performance.

- a. Daily Visual Inspection of the HSM or HSM-H Air Inlets and Outlets (Front Wall and Roof Bird Screens)*
 - b. Daily HSM or HSM-H Temperature Measurement*
-

APPLICABILITY: *During STORAGE OPERATIONS.*

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SR 3.1.5.a shows blockage of air vents (any blockage of the outlet vents or more than 50% of the inlet vents).	A. Clear the air vents.	16 hours
B. SR 3.1.5.a finds damaged bird screens.	B. Replace the bird screens.	30 days
C. SR 3.1.5.b shows a significant unexplained difference, so as to indicate the approach to the concrete material or fuel clad temperature criteria.	C. Take appropriate action to determine the cause and return the canister to normal operation.	16 hours
D. The measurement or other evidence suggests that the concrete accident temperature criteria (350 °F for HSM or the elevated temperature used in CoC Appendix A to perform concrete testing for HSM-H) has been exceeded for more than 24 hours.	D. The licensee can provide analysis results and/or test results in accordance with ACI-349, Appendix A.4.3, demonstrating that the structural strength of the HSM or HSM-H has an adequate margin of safety. Take additional appropriate actions if necessary based on the results of the evaluation above.	30 days

(continued)

SURVEILLANCE REQUIREMENTS	
SURVEILLANCE	FREQUENCY
<p>SR 3.1.5.a <i>A daily visual surveillance shall be conducted of the exterior of the air inlets and outlets to ensure that HSM air vents are not blocked for periods longer than assumed in the safety analysis.</i></p> <p><i>In addition, a visual inspection shall be performed to ensure that no materials accumulate between the modules (only applicable for HSM designs with gap between adjacent modules) that could block the air flow.</i></p> <p>OR</p>	Once per day.
<p>SR 3.1.5.b <i>Verify the thermal performance of each HSM or HSM-H via a direct temperature measurement on a daily basis. The temperature measurement could be any parameter such as (1) a direct measurement of the HSM or HSM-H temperatures, (2) a direct measurement of the DSC temperatures, (3) a comparison of the inlet and outlet temperature difference to predicted temperature differences for each individual HSM or HSM-H, or (4) other means that would identify and allow for the correction of off-normal thermal conditions that could lead to exceeding the concrete and fuel clad temperature criteria. If air temperatures are measured, they must be measured in such a manner as to obtain representative values of inlet and outlet air temperatures. Also, due to the proximity of adjacent HSM or HSM-H modules, care must be exercised to ensure that measured air temperatures reflect only the thermal performance of an individual module, and not the combined performance of adjacent modules.</i></p>	Once per day.

3.2 Cask Criticality Control

LCO 3.2.1 The boron concentration of the spent fuel pool water and the water added to the cavity of a loaded DSC (24P, 32PT, 24PHB, 24PTH, 32PTH1, or 37PTH) shall be greater than or equal to the boron concentration below:

DSC Model	Minimum Boron Concentration
24P	<p>a. 2000 ppm for fuel with an equivalent unirradiated maximum planar average enrichment of less than or equal to 1.45 wt. % U-235 per Figure 1-1.</p> <p>b. 2350 ppm for fuel with an equivalent unirradiated maximum planar average enrichment of greater than 1.45 wt. % U-235 per Figure 1-1.</p>
32PT	Per Table 1-1g or Table 1-1g1 or Table 1-1g2 or Table 1-1g3
24PHB	<p>a. 2350 ppm for fuel with the maximum planar average enrichment of less than or equal to 4.0 wt. % U-235 based on the spent fuel assembly with the highest maximum planar average initial enrichment in the DSC.</p> <p>b. Per Figure 1-10 and Figure 1-10a for fuel with the maximum planar average initial enrichment of greater than 4.0 wt. % U-235 based on the spent fuel assembly with the highest maximum planar average initial enrichment in the DSC.</p>
24PTH	Per Table 1-1p or Table 1-1q or Table 1-1q1
32PTH1	Per Table 1-1cc or Table 1-1dd or Table 1-1dd1
37PTH	Per Table 1-1oo or Table 1-1pp

APPLICABILITY: During LOADING OPERATIONS and UNLOADING OPERATIONS with fuel and liquid water in the DSC Cavity.

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Dissolved boron concentration limit not met.	A.1 Suspend loading of fuel assemblies into DSC.	Immediately
	<u>AND</u>	
	A.2	
	A.2.1 Add boron and re-sample, and test the concentration until the boron concentration is shown to be greater than that required.	Immediately
	<u>OR</u>	
	A.2.2 Remove all fuel assemblies from DSC.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.1 Verify dissolved boron concentration limit in spent fuel pool water and water to be added to the DSC cavity is met using two independent measurements (two samples analyzed by different individuals) for LOADING OPERATIONS.	Within 4 hours before insertion of the first fuel assembly into the DSC. <u>AND</u> Every 48 hours thereafter while the DSC is in the spent fuel pool or until the fuel has been removed from the DSC.
SR 3.2.2 Verify dissolved boron concentration limit in spent fuel pool water and water to be added to the DSC cavity is met using two independent measurements (two samples analyzed by different individuals) for UNLOADING OPERATIONS.	Once within 4 hours prior to flooding DSC during UNLOADING OPERATIONS. <u>AND</u> Every 48 hours thereafter while the DSC is in the spent fuel pool or until the fuel has been removed from the DSC.

3.3 Canister Integrity

3.3.1 DSC Closure Weld Non-Destructive Examination

LCO 3.3.1 *All DSC closure welds except those subjected to full volumetric inspection shall be dye penetrant tested in accordance with the requirements of the ASME Boiler and Pressure Vessel Code Section III, Division 1, Article NB-5000. The liquid penetrant test acceptance standards shall be those described in Subsection NB-5350 of the Code.*

This criteria is applicable to all DSCs. The welds include inner and outer top and bottom covers, and vent and siphon port covers.

APPLICABILITY: *During fabrication activities and during LOADING OPERATIONS.*

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. <i>The liquid penetrant test indicates that the weld is unacceptable.</i>	A.1 <i>Repair the weld in accordance with approved ASME procedures.</i> <u>AND</u> A.2 <i>Re-examine the new weld in accordance with this specification.</i>	14 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.1 <i>Perform dye penetrant testing of all DSC closure welds except those subjected to full volumetric inspection.</i>	<i>Once per each weld or repaired weld.</i>

3.3 Canister Integrity

3.3.2 DSC Inner Top Cover Plate Leak Test

LCO 3.3.2 *Following completion of the seal weld of the DSC inner top cover plate/top shield plug assembly, (including vent and siphon port cover) this weld shall be leak tested with a helium leak detection device. The leak testing is performed to the criteria as listed below:*

DSC Model	Leak Test Criterion
24P, 52B	$\leq 1 \times 10^{-4} \text{ atm.cm}^3/\text{sec}$
61BT, 32PT, 24PHB, 24PTH, 61BTH, 32PTH1, 69BTH, or 37PTH	$\leq 1 \times 10^{-7} \text{ Ref.cm}^3/\text{sec}$

APPLICABILITY: *During LOADING OPERATIONS.*

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. <i>The leakage rate of the inner seal weld exceeds the specified criterion.</i>	A. <i>Check the seal welds and the inner top cover and port covers for any surface indications resulting in leakage and repair.</i>	8 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.2 <i>Leak test the seal weld of the DSC inner top cover plate/top shield plug assembly, (including vent and siphon port cover).</i>	<i>Once, following each completion of the seal weld of the DSC inner top cover plate/top shield plug assembly, (including vent and siphon port cover) or repair of a weld or cover.</i>

3.4 Radiation Safety

3.4.1 Dry Shielded Canister Surface Contamination Levels

LCO 3.4.1 *The DSC smearable surface contamination levels on the outer top 1 foot surface of the DSC shall be less than 2,200 dpm/100 cm² from beta and gamma sources, and less than 220 dpm/100 cm² from alpha sources.*

APPLICABILITY: *During LOADING OPERATIONS, following placement of each loaded TC/DSC into the cask decontamination area but prior to seal welding the DSC inner top cover plate/top shield plug assembly to the DSC shell.*

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. <i>The required limits are not met.</i>	A. <i>Use any available commercial decontamination technique on the entire length of the DSC outer surface to attempt to reduce the DSC surface contamination levels to below the required limits.</i>	30 days
B. <i>After completing Action A.1 contamination levels are still not met.</i>	B. <i>Remove the fuel assemblies from the DSC and put them back in the fuel pool, remove the DSC from the TC and decontaminate as necessary, insert the clean DSC back in the TC, check and replace the TC/DSC annulus seal if needed, and repeat the canister loading process.</i>	30 days

(continued)

SURVEILLANCE REQUIREMENTS

<i>SURVEILLANCE</i>	<i>FREQUENCY</i>
<p><i>SR 3.4.1 Verify the DSC surface contamination levels.</i></p>	<p><i>Following placement of each loaded TC/DSC into the cask decontamination area, or after decontamination actions have been completed, but prior to seal welding of the DSC inner top cover plate/top shield plug assembly to the DSC shell.</i></p>

3.4 Radiation Safety

3.4.2 Transfer Cask Dose Rate Measurements

LCO 3.4.2 *The TC total dose rate shall be less than or equal to the value specified below for the various DSCs.*

Dose Rate Limits for the TC (except OS197L TC)

DSC Model	TC, Axial Surface Dose Rate Limit (mrem/hour)	TC, Radial Surface Dose Rate Limit (mrem/hour)
24P	600	600
52B	600	600
61BT	800	1200
32PT	900	1100
24PHB	1200	1200
24PTH-S and -L	1000	1500
24PTH-S-LC	1000	600
61BTH	2200	1350
32PTH1	1300	700
69BTH	2050	700
37PTH	1300	700

Dose Rate Limits for the OS197L TC

DSC Model	Axial Surface Dose Rate Limit (mrem/hour)	TC, Radial Decontamination Area Surface Dose Rate Limit (mrem/hour)
61BT	800	70
32PT	900	70

The following configuration shall be employed for all TC axial dose rate measurements:

- *Neutron shielding material present in the TC NS cavity*
- *TC/DSC annulus filled with water and water level in the annulus is at least up to the top of the fuel assembly level*
- *Bulk water removed from the DSC cavity. For the 24PHB DSC only, the DSC cavity is filled with water such that the fuel assemblies are submerged.*
- *DSC shield plug installed*
- *DSC inner top cover plate installed*
- *Temporary shielding consisting of a minimum of 3" NS-3 and a minimum of 1" steel or effective equivalent above the inner top cover plate, which is the analyzed configuration; however, if the dose rate limits above can be met without employing temporary shielding, temporary shielding is not required.*

(continued)

LCO 3.4.2 (continued)

The following locations shall be employed for all TC axial dose rate measurements:

- *Five locations are chosen within a radius of 10 to 25 inches (diameter of 20 to 50 inches) around the DSC centerline on the top surface of the temporary shielding (as described earlier) or the inner top cover plate if temporary shielding is not employed.*

The following configuration shall be employed for all TC radial dose rate measurements:

- *Neutron shielding material present in the TC NS cavity*
- *TC/DSC annulus water drained*
- *DSC cavity vacuum drying is complete*
- *DSC outer top cover plate welding completed*
- *TC top lid installed*
- *TC is in a vertical position*

In addition to the configuration above, decontamination area shielding is installed in the radial direction with a nominal thickness of 6 inches of steel only for the OS197L TC.

The following locations shall be employed for all TC radial dose rate measurements:

- *Eight approximately equally spaced locations around the radial surface of the cask at an axial location corresponding to within approximately 24" of the center of the TC.*
- *For the OS197L TC only, dose rate measurements are taken on the surface of the decontamination area shielding.*

APPLICABILITY: *During LOADING OPERATIONS.*

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Measured dose rates exceed above values.	A.1 Place temporary shielding around the affected areas of the TC and review plant records of the fuel assemblies which have been placed in the DSC to ensure that they conform to the fuel specification of Technical Specification 2.1 for the applicable DSCs.	8 hours
	<p><u>AND</u></p> <p>A.2 Submit a letter report to the NRC summarizing actions taken and the results of the surveillance, investigation and findings. The report must be submitted using instructions in 10 CFR 72.4 with a copy sent to the administrator of the appropriate NRC regional office.</p>	30 days

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.4.2 Measure TC dose rates.	As soon as possible after the TC is removed from the spent fuel pool when in the configuration defined in the LCO requirements but before the TC is downended on the transfer trailer to be transferred to the ISFSI.

4.0 ADMINISTRATIVE CONTROLS

4.1 Functional and Operating Limits Violations Reportability Actions

If any Functional and Operating Limit of Technical Specification 2.1 is violated, the following actions shall be completed:

4.1.1 Notify the NRC Operations Center per the requirements of 10 CFR 72.75.

4.1.2 Within 30 days, submit a separate report which describes the cause of the violation and the actions taken to restore compliance and prevent recurrence.

4.2 Procedures

Each user of the standardized NUHOMS® System shall prepare, review, and approve written procedures for all normal operations (cask handling, loading movement and surveillance) and maintenance at the ISFSI prior to its operation. The operating procedures suggested generically in the UFSAR should provide the basis for the user's written operating procedures. Written procedures shall be established, implemented, and maintained.

4.3 Programs

Each user of the NUHOMS® System will implement the following programs:

- *Radiological Environmental Monitoring Program*
- *Radiation Protection Program*

4.3.1 Radiological Environmental Monitoring Program

- a) *A radiological environmental monitoring program shall be implemented to verify that the annual dose equivalent to an individual located outside the ISFSI controlled area does not exceed the annual dose limits specified in 10 CFR 72.104(a).*
- b) *Operation of the ISFSI does not create any radioactive materials or result in any credible liquid or gaseous effluent release.*

4.3.2 Radiation Protection Program

As part of its evaluation pursuant to 10 CFR 72.212, the licensee shall perform an analysis to confirm that the limits of 10 CFR Part 20 and 10 CFR 72.104 will be satisfied under the actual site conditions and configurations considering the planned number of DSCs/HSMs to be used and the planned fuel loading conditions.

A dose assessment shall also be performed to account for occupational exposures during normal LOADING and TRANSFER OPERATIONS. If remote handling devices are used for movement of a TC during LOADING OPERATIONS then the dose assessment shall include recovery from the off-normal event of a potential malfunction of these devices. The licensee shall perform this dose assessment including occupational and public exposures from off-normal and accident conditions as a part of their 10 CFR 72.212 evaluations and augment their 10 CFR Part 20 radiation protection plan as required. The licensee shall develop appropriate measures (such as use of remote camera monitoring, use of temporary shielding etc.) to keep the dose rates ALARA during recovery from these potential malfunctions if needed. The licensee shall provide appropriate training to personnel involved in the possible repair/recovery operations.

When using an OS197L TC, the ALARA assessment shall include at least the assessment of occupational and public exposures associated with the following:

1. *The off-normal event of cask handling crane hangup during the movement of a loaded OS197L TC from the spent fuel pool to the decontamination area and from the decontamination area to the transfer trailer.*
2. *Surface, 100-meter and in the most affected unrestricted area (if any) dose rates from the transfer trailer without the top outer trailer shield in place for their impact on compliance with 10 CFR 72.104 and 10 CFR 20.1301(a)(2) dose values.*
3. *Worker doses associated with visual inspection of the openings at the top and bottom of the decontamination area shields.*
4. *Any other operation that has credible potential for high worker or public exposure.*

(continued)

4.3 Programs (continued)

For the OS197L, approved written procedures shall be developed and followed that address normal, off-normal, and accident conditions. Specifically, these procedures shall address the impact on plant operations due to potentially-increased radiation levels from the unshielded loaded OS197L. These may include operator actions required by 10 CFR Part 50 TSS, security guard actions, control room habitability, and response to alarms set off by the loaded OS197L.

Remote operations and appropriate ALARA practices shall be used due to very high dose rates during movement of the loaded OS197L TC from fuel pool to the decontamination area and from the decontamination area to the transfer trailer. When remote operations are used, approved written procedures shall be in place to govern these operations. When remote operations are used redundancy of equipment and their quality standards shall be considered and appropriate quality standards for the remote handling equipment shall be assigned.

When using an OS197L TC, the neutron shield (NS) shall be verified to be filled when DSC cavity draining or TC/DSC annulus draining operations are initiated and continually monitored during the first five minutes of the draining evolution to ensure the NS remains filled. The NS shall also be verified to be filled prior to movement of the loaded TC from the decontamination area (before the shield bell is removed). Observation of water level in the expansion tank or some other means can be used to verify compliance to this requirement.

When using a TC with a liquid NS, other than the OS197L TC, if draining the NS is required to meet the plant lifting crane capacity limits, the NS shall be verified to be filled after completion of the lift. If DSC cavity draining or TC/DSC annulus draining operations, as applicable, are initiated after the lift, the NS shall be verified to be filled before these draining operations are initiated and continually monitored during the first five minutes of the draining evolution to ensure the NS remains filled. Observation of water level in the expansion tank or some other means can be used to verify compliance to this requirement.

4.3.3 Hydrogen Gas Monitoring for 24P, 52B, 24PHB, 61BT, 32PT, 24PTH, 61BTH, 32PTH1, 69BTH, and 37PTH DSCs

For the 24P, 52B, 24PHB, 61BT, 32PT, 24PTH, 61BTH, 32PTH1, 69BTH and 37PTH DSCs, while welding the inner top cover plate during LOADING OPERATIONS, and while cutting the outer or inner top cover plates during UNLOADING OPERATIONS, hydrogen monitoring of the space under the shield plug in the DSC cavity is required, to ensure that the combustible mixture concentration remains below the flammability limit of 4%.

(continued)

4.3 Programs (continued)

4.3.4 Heavy Loads Requirements

Each lift of a DSC and TC must be made in accordance with the existing heavy loads requirements and procedures of the licensed facility at which the lift is made. A plant-specific safety review (under 10 CFR 50.59 or 10 CFR 72.48, if applicable) is required to show operational compliance with NUREG-0612 and or existing plant-specific heavy loads requirements.

If a single failure proof crane is not used, the licensee must evaluate the accidental drop of the shielding components of the OS197L TC under 10 CFR 50.59, 10 CFR 72.48, and 10 CFR 72.212, and evaluate the consequences of the accident drops.

4.3.5 Pre-Operational Testing and Training Exercise

A dry run training exercise of the loading, closure, handling, unloading and transfer of the Standardized NUHOMS® System shall be conducted by each licensee prior to the first use of the system to load spent nuclear fuel assemblies. The training exercise shall not be conducted with spent nuclear fuel in the canister. The dry run may be performed in an alternate step sequence from the actual procedural guidelines in the SAR. The dry run shall include, but need not be limited to the following:

Loading Operations

- a) Fuel Loading*
- b) DSC sealing, drying and backfilling operations*
- c) TC downending and transport to the ISFSI*
- d) DSC transfer to the HSM*
- e) Use of the remote crane operations and laser/optical systems for targeting if the OS197L TC is to be used for loading*
- f) Manual crane operations if the OS197L TC is to be used for loading*

Unloading Operations

- a) DSC retrieval from the HSM*
- b) Flooding of the DSC*
- c) Opening of the DSC*

4.4 Cask Transfer Controls

4.4.1 TC/DSC Lifting/Handling Height Limits

The requirements of 10 CFR Part 72 apply to TC/DSC lifting/handling height limits outside the FUEL BUILDING. The requirements of 10 CFR Part 50 apply to TC/DSC lifting/handling height limits inside the FUEL BUILDING.

A. TC/DSC Lifting/Handling Height at Low Temperature and Location

Confirm the basket temperature and ambient temperature before the TRANSFER OPERATIONS of the loaded TC/DSC.

The lifting/handling height of a loaded TC/DSC, is limited as a function of location and low temperature as follows:

- No lifts or handling of the TC/DSC at any height are permissible at DSC basket temperatures below -20 °F inside the FUEL BUILDING.*
- The maximum lift height of the TC/DSC shall be 80 inches if the basket temperature is below 0 °F but higher than -20 °F inside the FUEL BUILDING.*
- No lift height restriction is imposed on the TC/DSC if the basket temperature is higher than 0 °F inside the FUEL BUILDING and a special lifting device that has at least twice the normal stress design factor for handling heavy loads, or a single failure proof handling system is used. If the special lifting device or single failure proof handling system is not used, measures shall be taken such that the drop g loads do not exceed those analyzed for the TC/DSC.*
- When handling a loaded TC/DSC at a height greater than 80 inches outside the FUEL BUILDING, a special lifting device that has at least twice the normal stress design factor for handling heavy loads, or a single failure proof handling system shall be used and the basket temperature may not be lower than 0 °F.*

The requirements of 10 CFR Part 72 apply when the TC/DSC is in horizontal orientation on the transfer trailer. The requirements of 10 CFR Part 50 apply when the TC/DSC is being lifted/handled using the cask handling crane/hoist. (This distinction is valid only with respect to lifting/handling height limits.) If calculation or measurement of the basket temperature is unavailable, then the ambient temperature may be conservatively used.

B. TC/DSC TRANSFER OPERATIONS at High Ambient Temperatures

- The ambient temperature for TRANSFER OPERATIONS of a loaded TC/DSC (24P, 52B, 61BT, 32PT, 24PHB, 24PTH, 61BTH, 69BTH, or 37PTH DSC) shall not be greater than 100 °F (when the cask is exposed to direct insolation). The corresponding ambient temperature limit for a TC with a loaded 32PTH1 DSC is 106 °F.*
- For TRANSFER OPERATIONS when ambient temperature exceeds 100 °F (106 °F for 32PTH1 TC/DSC), a solar shield shall be used to provide protection against direct solar radiation.*

(continued)

4.4 Cask Transfer Controls (continued)

- *This ambient temperature limit applies to all TRANSFER OPERATIONS of a loaded TC/DSC outside the FUEL BUILDING.*
- *Confirm what the ambient temperature is before transfer of the TC/DSC and every 2 hours when the loaded cask is exposed to direct insolation during TRANSFER OPERATIONS. If the ambient temperature before the transfer operation is greater than 100 °F or if the ambient temperature is expected to exceed the above limits provide an appropriate solar shield.*

C. *Verification of concrete storage pad parameters*

Verify that the concrete storage pad parameters are consistent with the UFSAR analysis.

4.4.2 Trailer Shielding Drop onto OS197L TC

The DSC and the OS197L TC and the trailer shielding shall be inspected for damage and evaluated for further use after the accident drop of the trailer shielding onto the OS197L TC.

The lifting of outer top trailer shielding is restricted such that the bottommost part of the body of the outer top trailer shielding is less than 4 inches above the inner top trailer shielding.

Table 1-1a
PWR Fuel Specifications for Fuel to be Stored in the
Standardized NUHOMS®-24P DSC

PHYSICAL PARAMETERS	
Fuel	Only intact, unconsolidated PWR fuel assemblies (with or without BPRAs) with the following requirements:
Physical Parameters (without BPRAs)	
Maximum Assembly Weight	1682 lbs
Number of Assemblies per DSC	≤ 24 intact assemblies
Fuel Cladding	Zircaloy-clad fuel with no known or suspected gross cladding breaches
Physical Parameters (with BPRAs)	
Maximum Assembly + BPRA Weight	1682 lbs
Number of Assemblies per DSC	≤ 24 intact assemblies
Number of BPRAs per DSC	≤ 24 BPRAs
Fuel Cladding	Zircaloy-clad fuel with no known or suspected gross cladding breaches
NUCLEAR PARAMETERS	
Maximum Planar Average Initial Fuel Enrichment	≤ 4.0 wt. % U-235 Soluble boron requirements per Figure 1-1
BPRA Cooling Time (Minimum)	5 years for B&W Designs 10 years for Westinghouse Designs
<i>Minimum Cooling Time</i>	<i>5 years</i>
<i>Maximum Burnup</i>	<i>45 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>2.0 wt.% U-235</i>
<i>Decay Heat (Fuel + BPRA)</i>	<i>≤ 24.0 kW/DSC and ≤ 1.0 kW/FA</i>
ALTERNATE NUCLEAR PARAMETERS	
Maximum Planar Average Initial Fuel Enrichment	≤ 4.0 wt. % U-235 Soluble boron requirements per Figure 1-1
Assembly Average Burnup	≤ 40,000 MWd/MTU
Decay Heat (Fuel + BPRA)	≤ 1.0 kW per assembly
Neutron Fuel Source	≤ 2.23 x 10 ⁸ n/sec per assy with spectrum bounded by that in Chapter 7 of UFSAR
Gamma (Fuel + BPRA) Source	≤ 7.45 x 10 ¹⁵ g/sec per assy with spectrum bounded by that in Chapter 7 of UFSAR

Table 1-1b
BWR Fuel Specifications for Fuel to be Stored in the
Standardized NUHOMS® -52B DSC

PHYSICAL PARAMETERS	
Fuel	Only intact, unconsolidated BWR fuel assemblies with the following requirements:
Physical Parameters	
Maximum Assembly Weight	725 lbs
Number of Assemblies per DSC	≤ 52 intact channeled assemblies
Fuel Cladding	Zircaloy-clad fuel with no known or suspected gross cladding breaches
NUCLEAR PARAMETERS	
Maximum Lattice Average Initial Enrichment	≤ 4.0 wt. % U-235
<i>Minimum Cooling Time</i>	<i>3 years</i>
<i>Maximum Burnup</i>	<i>45 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>2.0 wt.% U-235</i>
<i>Decay Heat</i>	<i>≤ 19.2 kW/DSC and ≤ 0.37 kW/FA</i>
ALTERNATE NUCLEAR PARAMETERS	
Maximum Lattice Average Initial Enrichment	≤ 4.0 wt. % U-235
Assembly Average Burnup	≤ 35,000 MWd/MTU
Decay Heat	≤ 0.37 kW per assembly
Neutron Source	≤ 1.01 x 10 ⁸ n/sec per assy with spectrum bounded by that in Chapter 7 of UFSAR
Gamma Source	≤ 2.63 x 10 ¹⁵ g/sec per assy with spectrum bounded by that in Chapter 7 of UFSAR

Table 1-1c
BWR Fuel Specifications for Fuel to be Stored in the
Standardized NUHOMS®-61BT DSC

PHYSICAL PARAMETERS	
Fuel Design	7x7, 8x8, 9x9, or 10x10 BWR fuel assemblies
Cladding Material	Zircaloy
Fuel Damage	Cladding damage in excess of pinhole leaks or hairline cracks is not authorized to be stored as "Intact BWR Fuel."
Channels	Fuel may be stored with or without fuel channels.
Maximum Assembly Weight	705 lbs
RADIOLOGICAL PARAMETERS: ⁽³⁾ No interpolation of Radiological Parameters is permitted between Groups.	
Group 1	
Maximum Burnup	27,000 MWd/MTU
Minimum Cooling Time	5-years ⁽²⁾
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Assembly Average Enrichment	2.0 wt. % U-235
Maximum Decay Heat	300 W/assembly ⁽¹⁾
Group 2	
Maximum Burnup	35,000 MWd/MTU
Minimum Cooling Time	8-years ⁽²⁾
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Assembly Average Enrichment	2.65 wt. % U-235
Maximum Decay Heat	300 W/assembly ⁽¹⁾
Group 3	
Maximum Burnup	37,200 MWd/MTU
Minimum Cooling Time	6.5-years ⁽²⁾
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Assembly Average Enrichment	3.38 wt. % U-235
Maximum Decay Heat	300 W/assembly ⁽¹⁾
Group 4	
Maximum Burnup	40,000 MWd/MTU
Minimum Cooling Time	10-years ⁽²⁾
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Assembly Average Enrichment	3.4 wt. % U-235
Maximum Decay Heat	300 W/assembly ⁽¹⁾
MINIMUM BORON LOADING	
Maximum Lattice Average Enrichment (wt. % U-235)	Minimum B10 Content in Poison Plates (Basket Types ⁽⁴⁾)
4.4	Type C Basket
4.1	Type B Basket
3.7	Type A Basket
ALTERNATE RADIOLOGICAL PARAMETERS:	
Maximum Initial Enrichment:	See Minimum Boron Loading above
Maximum Decay Heat (<i>excluding transfer in OS197L</i>):	300 W/assembly ⁽¹⁾
<i>Maximum Decay Heat for Transfer in OS197L</i>	<i>See Figure 1-29</i>
<i>Minimum Cooling Time</i>	<i>4 years</i>
<i>Maximum Burnup</i>	<i>40 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>1.4 wt.% U-235</i>

⁽¹⁾ For FANP9 9x9-2 fuel assemblies, the maximum decay heat is limited to 0.21 kW/assembly.

⁽²⁾ For fuel assemblies containing BLEU fuel pellets, add 3.0 years additional cooling time to the minimum values shown in this table.

⁽³⁾ When the OS197L TC is employed, apply the requirements of Figure 1-29.

⁽⁴⁾ Basket Type is specified in Table 1-1k.

Table 1-1d
(Not Used)

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Table 1-1e
PWR Fuel Specifications for Fuel to be Stored in the NUHOMS®-32PT DSC

PHYSICAL PARAMETERS:	
Fuel Assembly Class	Intact (including reconstituted) or <i>damaged or failed</i> B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14 and WE 14x14 class PWR assemblies. Damaged and/or failed fuel assemblies beyond the definitions contained below are not authorized for storage.
Reconstituted Fuel Assemblies	≤ 32 assemblies per DSC with up to 56 irradiated stainless steel rods per assembly or unlimited number of lower enrichment UO ₂ rods per assembly.
Fuel Damage	Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods, fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that a fuel assembly is able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Failed Fuel	Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly cannot be handled by normal means. Fuel debris and fuel rods that have been removed from a fuel assembly and placed in a rod storage basket are also considered as failed fuel. Loose fuel debris, not contained in a rod storage basket must be placed in a failed fuel can for storage, provided the size of the debris is larger than the failed fuel can screen mesh opening and it is located at a position of at least 4" above the top of the bottom shield plug of the DSC. Fuel debris may be associated with any type of UO ₂ fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its contents shall be less than 1682 lb.

(continued)

Table 1-1e
PWR Fuel Specifications for Fuel to be Stored in the NUHOMS®-32PT DSC

Control Components (CCs)	<ul style="list-style-type: none"> Up to 32 CCs are authorized for storage in the 32PT DSC. Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assembly (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs) and Neutron Sources. Non-fuel hardware that are positioned within the fuel assembly after the fuel assembly is discharged from the core such as Guide Tube or Instrument Tube Tie Rods or Anchors, Guide Tube Inserts, BPRA Spacer Plates or devices that are positioned and operated within the fuel assembly during reactor operation such as those listed above are also considered as CCs. Design basis radiological characteristics for the CCs are listed in Table 1-1ee.
Maximum Assembly plus CC Weight	-1365 lbs for 32PT-S100 & 32PT-L100 System -1682 lbs for 32PT-S125 & 32PT-L125 System
<i>Number of Intact Assemblies</i>	≤ 32
Number and Location of Damaged Assemblies	Maximum of 28 damaged fuel assemblies as shown in Figure 1-4b. Balance may be intact assemblies, empty slots, or dummy assemblies as specified in Figure 1-2, Figure 1-3, Figure 1-4, and Figure 1-4a. The DSC basket cells which store damaged fuel assemblies are provided with top and bottom end caps to assure retrievability.
Number and Location of Failed Assemblies	Maximum of 8 failed fuel assemblies as shown in Figure 1-4b. Balance may be intact and/or damaged fuel assemblies, empty slots, or dummy assemblies as specified in Figure 1-3. Failed fuel assembly/fuel debris is loaded in an individual failed fuel can (FFC).
<i>Fuel Cladding</i>	<i>Zirconium alloy clad fuel</i>
<i>Minimum Cooling Time (excluding transfer in OS197L)</i>	<i>2 years</i>
<i>Maximum Burnup (excluding transfer in OS197L)</i>	<i>62 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment (excluding transfer in OS197L)</i>	<i>0.2 wt.% U-235</i>
<i>Decay Heat (excluding transfer in OS197L)</i>	<i>DSC and fuel assembly decay heat limits as specified in Figure 1-2, Figure 1-3, Figure 1-4, and Figure 1-4a</i>
<i>Minimum Cooling Time for transfer in OS197L</i>	<i>5 years</i>
<i>Maximum Burnup for transfer in OS197L</i>	<i>45 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment for transfer in OS197L</i>	<i>1.1 wt.% U-235</i>
<i>Decay Heat for transfer in OS197L</i>	<i>See Figure 1-30</i>
Maximum Planar Average Initial Fuel Enrichment	Per Table 1-1g, Table 1-1g1, Table 1-1g2 and Table 1-1g3, as applicable.

Table 1-1f
(Not Used)

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Table 1-1g
Maximum Planar Average Initial Enrichment and Required Number of PRAs and
Minimum Soluble Boron Loading (NUHOMS®-32PT DSC) – Intact Fuel

Assembly Class	Soluble Boron Loading (ppm)	No PRAs (Type A)		4 PRAs (Type B)	8 PRAs (Type C)	16 PRAs (Type D)
		Poison Plate Configuration		Poison Plate Configuration	Poison Plate Configuration	Poison Plate Configuration
		16	24	24	24	24
WE 17x17 Fuel Assembly (with and without CC)	2500	3.40	3.40	4.00	4.50	5.00
B&W 15x15 Mark B Fuel Assembly (with and without CC)	2500	3.30	3.30	3.90	NE	5.00
WE 15x15 Fuel Assembly (without CC)	2500	3.40	3.40	4.00	4.60	5.00
WE 15x15 Fuel Assembly (with CC)	2500	3.40	3.40	4.00	4.55	5.00
CE 14x14 Fuel Assembly (without CC)	1800	3.35	3.50	4.00	4.35	NE
	2000	3.50	3.70	4.20	4.55	NE
	2100	3.60	3.80	4.30	4.70	NE
	2200	3.70	3.90	4.40	4.80	NE
	2300	3.75	4.00	4.50	4.90	NE
	2400	3.80	4.05	4.60	5.00	NE
	2500	3.90	4.15	4.70	5.00	NE
CE 14x14 Fuel Assembly (with CC)	1800	3.30	3.45	3.90	4.25	NE
	2000	3.45	3.65	4.10	4.50	NE
	2100	3.55	3.75	4.20	4.60	NE
	2200	3.60	3.80	4.30	4.70	NE
	2300	3.65	3.90	4.40	4.80	NE
	2400	3.80	4.00	4.50	4.90	NE
	2500	3.90	4.05	4.60	5.00	NE
WE 14x14 Fuel Assembly (with and without CC)	1800	3.55	3.75	4.40	NE	NE
	2000	3.75	3.90	4.60	NE	NE
	2100	3.80	4.00	4.75	NE	NE
	2200	3.90	4.10	4.85	NE	NE
	2300	4.00	4.20	5.00	NE	NE
	2400	4.10	4.30	5.00	NE	NE
	2500	4.15	4.40	5.00	NE	NE
CE 15x15 Fuel Assembly	1800	3.00	3.15	NE	NE	NE
	2000	3.15	3.30	NE	NE	NE
	2100	3.20	3.40	NE	NE	NE
	2200	3.30	3.50	NE	NE	NE
	2300	3.35	3.55	NE	NE	NE
	2400	3.40	3.60	NE	NE	NE
	2500	3.50	3.70	NE	NE	NE

NOTES:

PRAs = Poison Rod Assemblies. Figure 1-5, Figure 1-6 and Figure 1-7 provide the required PRA configurations.

PRAs can be B₄C PRAs or AIC PRAs as specified in Table 1-1h

CC = Control Components. CCs and PRAs cannot be loaded in the same fuel assembly

Type = Basket Types are specified in Table 1-1h.

NE = Not Evaluated

Table 1-1g1
Maximum Planar Average Initial Enrichment for Type A1 and A2 Basket and Minimum Soluble Boron Loading (NUHOMS®-32PT DSC) – Intact Fuel

Assembly Class and Type	Soluble Boron Loading (ppm)	No PRAs (Type A1 and A2)	
		24 Poison Plate Configuration	
		Type A1 (0.015 g B10/cm ²)	Type A2 (0.020 g B10/cm ²)
WE 17x17 fuel assembly (without CC)	2500	4.05	4.20
	2800	4.30	4.50
WE 17x17 fuel assembly (with CC)	2500	4.00	4.15
	2800	4.25	4.45
B&W 15x15 Mark B fuel assembly (without CC)	2500	4.00	4.10
B&W 15x15 Mark B fuel assembly (with CC)	2500	3.90	4.10
WE 15x15 fuel assembly (without CC)	2500	4.10	4.20
WE 15x15 fuel assembly (with CC)	2500	4.10	4.20
CE 14x14 fuel assembly (without CC)	1800	3.95	4.10
	2100	4.30	4.45
	2300	4.50	4.70
	2500	4.70	4.90
CE 14x14 fuel assembly (with CC)	1800	3.80	3.95
	2100	4.10	4.25
	2300	4.30	4.50
	2500	4.50	4.70
WE 14x14 fuel assembly (without CC)	1800	4.20	4.20
	2100	4.55	4.60
	2300	4.80	5.00
	2500	5.00	5.00
WE 14x14 fuel assembly (with CC)	1800	4.20	4.35
	2100	4.60	4.75
	2300	4.80	5.00
	2500	5.00	5.00
CE 15x15 fuel assembly	1800	3.50	3.60
	2100	3.75	3.90
	2300	3.95	4.10
	2500	4.10	4.30
	2800	4.45	4.55
Assembly Class and Type	Soluble Boron Loading (ppm)	No PRA	
		32 Poison Plate Configuration	
		Type A1-32	Type A2-32
WE 17x17 fuel assembly (without CC)	2500	4.45	4.65
	2800	4.75	5.00
WE 17x17 fuel assembly (with CC)	2500	4.40	4.60
	2800	4.70	4.90
CE 15x15 fuel assembly (CC not allowed)	2500	4.55	4.75
	2800	4.85	5.00

(continued)

Table 1-1g1
Maximum Planar Average Initial Enrichment for Type A1 and A2 Basket and Minimum Soluble Boron Loading (NUHOMS®-32PT DSC) – Intact Fuel

Assembly Class and Type	Soluble Boron Loading (ppm)	4 B₄C PRAs	
		24 Poison Plate Configuration	
		Type B1	Type B2
WE 17x17 fuel assembly (without CC)	2800	4.85	4.95
Assembly Class and Type	Soluble Boron Loading (ppm)	4 AIC PRAs	
		24 Poison Plate Configuration	
		Type B1-r	Type B2-r
WE 17x17 fuel assembly (without CC)	2800	4.60	4.75
Assembly Class and Type	Soluble Boron Loading (ppm)	8 B₄C PRAs	
		24 Poison Plate Configuration	
		Type C1	
WE 17x17 fuel assembly (without CC)	2800	5.00	NE
Assembly Class and Type	Soluble Boron Loading (ppm)	8 AIC PRAs	
		24 Poison Plate Configuration	
		Type C1-r	Type C2-r
WE 17x17 fuel assembly (without CC)	2800	4.85	5.00

Notes:

PRAs can be B₄C PRAs or AIC PRAs as specified in Table 1-1h

CC = Control Components

Type = Basket Types are Specified in Table 1-1h

NE = Not Evaluated

Table 1-1g2
Maximum Planar Average Initial Enrichment for Type A1 and A2 Basket and Minimum Soluble Boron Loading (NUHOMS®-32PT DSC) – Damaged Fuel

Assembly Class and Type	Soluble Boron Loading (ppm)	28 Damaged Fuels	
		32 Poison Plate Configuration	
		Type A1	Type A2
WE 17x17 fuel assembly (without CC)	2500	4.40	4.60
CE 15x15 fuel assembly (without CC)	2800	4.70	4.90
Assembly Class and Type	Soluble Boron Loading (ppm)	28 Damaged Fuels	
		24 Poison Plate Configuration	
		Type A1	Type A2
WE 17x17 fuel assembly (without CC)	2500	4.00	4.20
CE 15x15 fuel assembly (without CC)	2800	4.30	4.45
WE 14x14 fuel assembly (without CC)	1800	3.80	3.95
	2100	4.10	4.25
	2300	4.30	4.45
	2500	4.50	4.65
CE 14x14 fuel assembly (without CC)	1800	3.70	3.85
	2100	4.00	4.15
	2300	4.20	4.35
	2500	4.40	4.50
	2600	4.45	4.65
Assembly Class and Type	Soluble Boron Loading (ppm)	16 Damaged Fuels	
		24 Poison Plate Configuration	
		Type A1	Type A2
CE 14x14 fuel assembly (without CC) WE 14x14 fuel assembly (without CC)	1800	3.80	3.95
	2100	4.10	4.25
	2300	4.30	4.45
	2500	4.50	4.70
	2600	4.60	4.80

Notes:

CC = Control Components

Type = Basket Types are Specified in Table 1-1h, Figure 1-5, Figure 1-6 and Figure 1-7 provide the required PRA configurations.

Damaged Fuel locations are shown in Figure 1-4b.

Table 1-1g3
Maximum Planar Average Initial Enrichment for Type A1 and A2 Basket and Minimum Soluble Boron Loading (NUHOMS®-32PT DSC) – Damaged or Failed Fuel

Assembly Class and Type	FFC Array Size	Soluble Boron Loading (ppm)	8 Failed Fuels	
			24 Poison Plate Configuration	
			Type A1	Type A2
WE 17x17 fuel assembly (without CC) CE 15x15 fuel assembly (without CC)	14x14	2500	4.15	4.30
		2800	4.40	4.60
	15x15	2500	4.10	4.25
		2800	4.40	4.55
	16x16	2500	4.05	4.20
		2800	4.35	4.50
	17x17	2500	4.00	4.15
		2800	4.30	4.45
WE 14x14 fuel assembly (without CC) Damaged or Failed Fuel Assemblies	14x14	1800	4.15	4.30
		2100	4.50	4.70
		2300	4.75	4.95
		2500	4.95	5.00
CE 14x14 fuel assembly (without CC)	14x14	2600	4.70	4.90
Assembly Class and Type	FFC Array Size	Soluble Boron Loading (ppm)	8 Failed Fuels	
			32 Poison Plate Configuration	
			Type A1-32	Type A2-32
WE 17x17 fuel assembly (without CC) CE 15x15 fuel assembly (without CC)	14x14	2500	4.55	4.75
		2800	4.85	5.00
	15x15	2500	4.50	4.70
		2800	4.80	5.00
	16x16	2500	4.45	4.65
		2800	4.75	4.95
	17x17	2500	4.40	4.60
		2800	4.65	4.90

Notes:

CC = Control Components

Type = Basket Types are Specified in Table 1-1h

Damaged Fuel locations are shown in Figure 1-4b

Table 1-1h
Specification for the NUHOMS®-32PT Poison Plates and PRAs

NUHOMS®-32PT DSC Basket Type	Number of B₄C PRAs ⁽¹⁾⁽²⁾	Minimum B-10 Areal Density, gm/cm²
A	0	0.0070
A1, A1-32	0	0.0150
A2, A2-32	0	0.0200
B	4	0.0070
B1	4	0.0150
B2	4	0.0200
C	8	0.0070
C1	8	0.0150
D	16	0.0070
NUHOMS®-32PT DSC Basket Type	Number of AIC PRAs ⁽¹⁾⁽³⁾	Minimum B-10 Areal Density, gm/cm²
B1-r	4	0.0150
B2-r	4	0.0200
C1-r	8	0.0150
C2-r	8	0.0200

Notes:

- (1) Figure 1-5, Figure 1-6 and Figure 1-7 provide the required PRA configurations
- (2) PRAs with Boron Carbide absorber are specified as B₄C PRAs. Minimum B₄C content per absorber rod is 0.79 grams/cm
- (3) PRAs with Silver-Indium-Cadmium absorber are specified as AIC PRAs. Minimum Silver content per absorber rod is 2.46 grams/cm

Table 1-1i
PWR Fuel Specifications for Fuel to be Stored in the
Standardized NUHOMS®-24PHB DSC

PHYSICAL PARAMETERS	
<p>Fuel Class</p> <p>Maximum Number of Irradiated Stainless Steel Rods in Reconstituted Assemblies per DSC</p> <p>Maximum Number of Irradiated Stainless Steel Rods per Reconstituted Assembly</p> <p>Maximum Number of Reconstituted Assemblies per DSC with Low Enriched Uranium Oxide Rods</p>	<p>Intact or damaged, unconsolidated B&W 15x15 (with or without CCs), intact WE 17x17, intact WE 15x15, intact CE 14x14 and intact WE 14x14 Class PWR fuel assemblies (all without CCs) or equivalent reload fuel manufactured by other vendor, with the following requirements: Damaged fuel assemblies beyond the definition contained below are not authorized for storage.</p> <p>40</p> <p>10</p> <p>24</p>
Fuel Damage	<p>Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods, fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that a fuel assembly is able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.</p>
Control Components	<ul style="list-style-type: none"> Up to 24 CCs are authorized for storage in 24PHBL DSCs only. Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs), and Neutron Sources. Non-fuel hardware that are positioned within the fuel assembly after the fuel assembly is discharged from the core such as Guide Tube or Instrument Tube Tie Rods or Anchors, Guide Tube Inserts, BPRA Spacer Plates or devices that are positioned and operated within the fuel assembly during reactor operation such as those listed above are also considered as CCs. Design basis radiological characteristics for the CCs are listed in Table 1-1n⁽¹⁾.

(continued)

Table 1-1i
PWR Fuel Specifications for Fuel to be Stored in the
Standardized NUHOMS®-24PHB DSC

Fuel Cladding	Zirconium alloy clad fuel
Number of Intact Assemblies	≤ 24
Number and Location of Damaged Assemblies	Up to 4 damaged fuel assemblies. Balance may be intact fuel assemblies or empty slots depending on the specific heat load zone configuration. Damaged fuel assemblies are to be placed in locations as shown in Figure 1-8 or Figure 1-9. The basket cells which store damaged fuel assemblies are provided with top and bottom end caps.
Maximum Assembly plus CC Weight	1682 lbs.
Nuclear Parameters	
Maximum Planar Average Initial Enrichment	Per Figure 1-10 or Figure 1-10a
Minimum Boron Loading	Per Figure 1-10 or Figure 1-10a
Allowable loading configurations for each 24PHB DSC	As specified in Figure 1-8 or Figure 1-9
Minimum Cooling Time for CCs	5 years
Total Decay Heat per DSC	24 kW
Decay Heat Limits for Zone 1, 2 and 3 Fuel	As specified in Figure 1-8 and Figure 1-9
<i>Minimum Cooling Time</i>	<i>5 years</i>
<i>Maximum Burnup</i>	<i>55 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>2.0 wt.% U-235</i>

(1) Radiological characteristics for CCs listed in this table for 24PTH DSC are also applicable to 24PHB DSC.

Table 1-1j
BWR Fuel Specification of Damaged Fuel to be Stored in the Standardized
NUHOMS®-61BT DSC

PHYSICAL PARAMETERS:	
Fuel Design	7x7, 8x8 BWR damaged fuel assemblies. Damaged fuel assemblies beyond the definition contained below are not authorized for storage.
Cladding Material	Zircaloy
Fuel Damage	Damaged BWR fuel assemblies are fuel assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that the fuel assembly is able to be handled by normal means. Missing cladding and/or crack size in the fuel pins is to be limited such that a fuel pellet is not able to pass through the gap created by the cladding opening during handling. Damaged fuel shall be stored with Top and Bottom Caps. Damaged fuel may only be stored in the 2x2 compartments of the "Type C" NUHOMS®-61BT Canister described in Table 1-1k.
Channels	Fuel may be stored with or without fuel channels.
Maximum Assembly Weight	705 lbs
RADIOLOGICAL PARAMETERS:⁽²⁾	No interpolation of Radiological Parameters is permitted between groups.
Group 1	
Maximum Burnup	27,000 MWd/MTU
Minimum Cooling Time	5-years ⁽¹⁾
Maximum Initial Lattice Average Enrichment	4.0 wt. % U-235
Maximum Pellet Enrichment	4.4 wt. % U-235
Minimum Initial Assembly Average Enrichment	2.0 wt. % U-235
Maximum Decay Heat	300 W/assembly
Group 2	
Maximum Burnup	35,000 MWd/MTU
Minimum Cooling Time	8-years ⁽¹⁾
Maximum Initial Lattice Average Enrichment	4.0 wt. % U-235
Maximum Pellet Enrichment	4.4 wt. % U-235
Minimum Initial Assembly Average Enrichment	2.65 wt. % U-235
Maximum Decay Heat	300 W/assembly
Group 3	
Maximum Burnup	37,200 MWd/MTU
Minimum Cooling Time	6.5-years ⁽¹⁾
Maximum Initial Lattice Average Enrichment	4.0 wt. % U-235
Maximum Pellet Enrichment	4.4 wt. % U-235
Minimum Initial Assembly Average Enrichment	3.38 wt. % U-235
Maximum Decay Heat	300 W/assembly

(continued)

Table 1-1j
BWR Fuel Specification of Damaged Fuel to be Stored in the Standardized
NUHOMS®-61BT DSC

RADIOLOGICAL PARAMETERS:⁽²⁾	
Group 4	
Maximum Burnup	40,000 MWd/MTU
Minimum Cooling Time	10-years ⁽¹⁾
Maximum Initial Lattice Average Enrichment	4.0 wt. % U-235
Maximum Pellet Enrichment	4.4 wt. % U-235
Minimum Initial Assembly Average Enrichment	3.4 wt. % U-235
Maximum Decay Heat	300 W/assembly
ALTERNATE RADIOLOGICAL PARAMETERS:	
Maximum Initial Lattice Average Enrichment	4.0 wt. % U-235
Maximum Pellet Enrichment	4.4 wt. % U-235
Maximum Decay Heat (<i>excluding transfer in OS197L</i>)	300 W/assembly
<i>Maximum Decay Heat for Transfer in OS197L</i>	<i>See Figure 1-29</i>
<i>Minimum Cooling Time</i>	<i>4 years</i>
<i>Maximum Burnup</i>	<i>40 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>1.4 wt.% U-235</i>

⁽¹⁾ For fuel assemblies containing BLEU fuel pellets, add 3.0 years additional cooling time to the minimum values shown in this table.

⁽²⁾ When the OS197L TC is employed, apply the requirements of Figure 1-29.

Table 1-1k
B10 Specification for the NUHOMS®-61BT Poison Plates

NUHOMS®-61BT DSC Basket Type	Minimum B10 Areal Density (grams/cm ²)	
	Borated Aluminum or MMC	Boral®
A	0.021	0.025
B	0.032	0.038
C	0.040	0.048

Table 1-11
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-24PTH DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged or failed unconsolidated B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14 and WE 14x14 class PWR assemblies (with or without control components). Damaged and/or failed fuel assemblies beyond the definitions contained below are not authorized for storage.
Fuel Damage	Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods, fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that the fuel assembly is able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Failed Fuel	Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly cannot be handled by normal means. Fuel debris and fuel rods that have been removed from a fuel assembly and placed in a rod storage basket are also considered as failed fuel. Loose fuel debris, not contained in a rod storage basket must be placed in a failed fuel can for storage, provided the size of the debris is larger than the failed fuel can screen mesh opening and it is located at a position of at least 10" above the top of the bottom shield plug of the DSC. Fuel debris may be associated with any type of UO ₂ fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its contents shall be less than 1682 lb.
Partial Length Shield Assemblies (PLSAs)	WE 15x15 class PLSAs which have only ever been irradiated in peripheral core locations with following characteristics are authorized: <ul style="list-style-type: none"> • Maximum burnup, 40 GWd/MTU • Minimum cooling time, 6.5 years • Maximum decay heat, 900 watts

(continued)

Table 1-11
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-24PTH DSC

Reconstituted Fuel Assemblies: <ul style="list-style-type: none"> Maximum Number of Irradiated Stainless Steel Rods in Reconstituted Assemblies per DSC Maximum Number of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly Maximum Number of Reconstituted Assemblies per DSC with unlimited number of low enriched UO₂ rods and/or Unirradiated Stainless Steel Rods and/or Zr Rods or Zr Pellets 	40 10 24
Control Components (CCs)	<ul style="list-style-type: none"> Up to 24 CCs are authorized for storage in 24PTH-L, 24PTH-S, and 24PTH-S-LC DSCs only. Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Assembly Rods (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs), and Neutron Sources. Non-fuel hardware that are positioned within the fuel assembly after the fuel assembly is discharged from the core such as Guide Tube or Instrument Tube Tie Rods or Anchors, Guide Tube Inserts, BPRA Spacer Plates or devices that are positioned and operated within the fuel assembly during reactor operation such as those listed above are also considered as CCs. Design basis radiological characteristics for the CCs are listed in Table 1-1n.
Number of Intact Assemblies	≤ 24
Number and Location of Damaged Assemblies	<p>Maximum of 12 damaged fuel assemblies. Balance may be intact fuel assemblies, empty slots, or dummy assemblies depending on the specific heat load zoning configuration.</p> <p>Damaged fuel assemblies are to be placed in Location A and/or B as shown in Figure 1-16. The DSC basket cells which store damaged fuel assemblies are provided with top and bottom end caps to assure retrievability.</p>
Number and Location of Failed Assemblies	<p>Up to 8 failed fuel assemblies. Balance may be intact and/or damaged fuel assemblies, empty slots, or dummy assemblies depending on the specific heat load zoning configuration.</p> <p>Failed fuel assemblies are to be placed in Location A as shown in Figure 1-16. Failed fuel assembly/fuel debris is to be encapsulated in an individual failed fuel can (FFC) provided with a welded bottom closure and a removable top closure.</p>
Maximum Assembly plus CC Weight	1682 lbs
<i>Fuel Cladding</i>	<i>Zirconium alloy clad fuel</i>

(continued)

Table 1-11
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-24PTH DSC

THERMAL/RADIOLOGICAL PARAMETERS:	
Maximum Planar Average Initial Fuel Enrichment	Per Table 1-1p or Table 1-1q or Table 1-1q1
Decay Heat	<p>Type 1 Basket: ≤ 40.8 kW for 24PTH-S and 24PTH-L DSCs with decay heat limits for Zones 1, 2, 3, 4, and 6 as specified in Figure 1-11 or Figure 1-12 or Figure 1-13 or Figure 1-14 or Figure 1-15a.</p> <p>Type 2 Basket: Same as Type 1 Basket except ≤ 31.2 kW/DSC and ≤ 1.3 kW/fuel assembly for 24PTH-S and 24PTH-L DSCs. ≤ 24.0 kW for 24PTH-S-LC DSC with decay heat limits as specified in Figure 1-15.</p>
Minimum Boron Loading	Per Table 1-1p or Table 1-1q or Table 1-1q1
<i>Minimum Cooling Time</i>	<i>2 years</i>
<i>Maximum Burnup</i>	<i>62 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>0.2 wt. % U-235</i>

Table 1-1m
(Not Used)

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Table 1-1n
Radiological Characteristics for Control Components Stored in the NUHOMS® -24PTH DSC and 24PHB DSC

Parameter	BPRAs, NSAs, CRAs, RCCAs, VSIs, Neutron Sources and APSRAs	TPAs and ORAs
Maximum Gamma Source (γ/sec/DSC)	9.3E+14	9.8E+13

Note: NSAs and Neutron Sources shall only be stored in the interior compartments of the basket. Interior compartments are those compartments that are completely surrounded by other compartments, including the corners. There are four interior compartments in the 24PTH DSC.

**Table 1-1o
(Not Used)**

Table 1-1p
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for the
NUHOMS® -24PTH DSC (Intact Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)			
	Minimum Soluble Boron (ppm)	Basket Type ⁽³⁾		
		1A or 2A	1B or 2B	1C or 2C
CE 14x14 ⁽¹⁾	2100	4.50	4.90	5.00
	2200	4.60	5.00	5.00
	2300	4.70	5.00	5.00
	2400	4.80	5.00	5.00
	2500	4.90	5.00	5.00
	2600	5.00	5.00	5.00
WE 14x14 ⁽²⁾	2100	4.80	5.00	5.00
	2200	4.90	5.00	5.00
	2300	5.00	5.00	5.00
CE 15x15 ⁽²⁾	2100	3.90	4.20	4.60
	2200	4.00	4.40	4.70
	2300	4.10	4.50	4.80
	2400	4.20	4.60	4.90
	2500	4.30	4.70	5.00
	2600	4.40	4.80	5.00
	2700	4.50	4.90	5.00
	2800	4.50	5.00	5.00
	2900	4.60	5.00	5.00
	3000	4.70	5.00	5.00
WE 15x15 ⁽²⁾	2100	3.80	4.20	4.60
	2200	3.90	4.30	4.70
	2300	4.00	4.40	4.80
	2400	4.10	4.50	4.90
	2500	4.20	4.60	5.00
	2600	4.30	4.70	5.00
	2700	4.30	4.80	5.00
	2800	4.40	4.90	5.00
	2900	4.50	5.00	5.00
	3000	4.60	5.00	5.00

(continued)

Table 1-1p
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for the
NUHOMS® -24PTH DSC (Intact Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)			
	Minimum Soluble Boron (ppm)	Basket Type ⁽³⁾		
		1A or 2A	1B or 2B	1C or 2C
WE 17x17⁽²⁾	2100	3.80	4.10	4.50
	2200	3.90	4.20	4.60
	2300	4.00	4.30	4.70
	2400	4.00	4.40	4.80
	2500	4.10	4.50	4.90
	2600	4.20	4.60	5.00
	2700	4.30	4.70	5.00
	2800	4.40	4.80	5.00
	2900	4.50	4.90	5.00
	3000	4.60	5.00	5.00
B&W 15x15⁽²⁾	2100	3.60	4.00	4.30
	2200	3.70	4.10	4.50
	2300	3.80	4.20	4.60
	2400	3.90	4.30	4.70
	2500	4.00	4.40	4.80
	2600	4.10	4.50	4.90
	2700	4.20	4.60	5.00
	2800	4.20	4.70	5.00
	2900	4.30	4.80	5.00
	3000	4.40	4.90	5.00

Notes:

- (1) When CCs that extend into the active fuel region are stored, the maximum planar average initial enrichment shall be reduced by 0.2 wt. %.
- (2) When CCs that extend into the active fuel region are stored, the maximum planar average initial enrichment shall be reduced by 0.05 wt. % or the soluble boron concentration shall be increased by 50 ppm.
- (3) The fixed poison loading requirements as a function of Basket Type are specified in Table 1-1r.

Table 1-1q
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for the
NUHOMS®-24PTH DSC (Damaged Fuel)

Assembly Class	Maximum Number of Damaged Fuel Assemblies per DSC	Maximum Planar Average Initial Enrichment (wt. % U-235) for Damaged Fuel Assemblies ⁽³⁾ as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)			
		Minimum Soluble Boron (ppm)	Basket Type ⁽⁴⁾		
			1A or 2A	1B or 2B	1C or 2C
CE 14x14 ⁽¹⁾	12	2150	NE	4.70	NE
	12	2450	4.50	5.00	5.00
WE 14x14 ⁽²⁾	12	2150	4.50	5.00	5.00
CE 15x15 ⁽²⁾	12	2150	NE	NE	4.50
	12	2550	NE	NE	5.00
WE 15x15 ⁽²⁾	12	2250	NE	NE	4.50
	12	2650	NE	NE	5.00
B&W 15x15 ⁽²⁾	12	2350	NE	NE	4.50
	12	2800	NE	NE	5.00
WE 17x17 ⁽²⁾	12	2250	NE	NE	4.50
	12	2650	NE	NE	5.00

Notes:

- (1) When CCs that extend into the active fuel region are stored, the maximum planar average initial enrichment shall be reduced by 0.2 wt. %.
- (2) When CCs that extend into the active fuel region are stored, the maximum planar average initial enrichment shall be reduced by 0.05 wt. % or the soluble boron concentration shall be increased by 50 ppm.
- (3) Enrichment limits are applicable when more than 8 damaged fuel assemblies are loaded.
- (4) The fixed poison loading requirements as a function of Basket Type are specified in Table 1-1r.

NE = Not Evaluated.

Table 1-1q1
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for the
NUHOMS®-24PTH DSC (up to 8 Damaged/Failed Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) for Loading up to Eight Damaged and/or Failed Fuel Assemblies ⁽³⁾ as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)			
	Minimum Soluble Boron (ppm)	Basket Type ⁽⁴⁾		
		1A or 2A	1B or 2B	1C or 2C
CE 14x14 ⁽²⁾	2100	4.40	4.90	5.00
	2200	4.55	5.00	5.00
	2300	4.60	5.00	5.00
	2400	4.60	5.00	5.00
	2500	4.90	5.00	5.00
	2600	5.00	5.00	5.00
WE 14x14 ⁽¹⁾	2100	4.75	5.00	5.00
	2200	4.90	5.00	5.00
	2300	4.90	5.00	5.00
	2400	5.00	5.00	5.00
CE 15x15 ⁽¹⁾	2100	3.90	4.20	4.60
	2200	4.00	4.40	4.70
	2300	4.10	4.50	4.80
	2400	4.20	4.60	4.90
	2500	4.30	4.70	5.00
	2600	4.40	4.80	5.00
	2700	4.50	4.90	5.00
	2800	4.50	5.00	5.00
	2900	4.60	5.00	5.00
	3000	4.70	5.00	5.00
WE 15x15 ⁽¹⁾	2100	3.80	4.20	4.60
	2200	3.90	4.25	4.70
	2300	4.00	4.40	4.80
	2400	4.10	4.50	4.90
	2500	4.20	4.60	5.00
	2600	4.30	4.70	5.00
	2700	4.30	4.80	5.00
	2800	4.40	4.90	5.00
	2900	4.50	5.00	5.00
	3000	4.60	5.00	5.00

(continued)

Table 1-1q1
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for the
NUHOMS®-24PTH DSC (up to 8 Damaged/Failed Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) damaged fuel assemblies ⁽³⁾ as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)			
	Minimum Soluble Boron (ppm)	Basket Type ⁽⁴⁾		
		1A or 2A	1B or 2B	1C or 2C
WE 17x17⁽¹⁾	2100	3.80	4.10	4.50
	2200	3.90	4.20	4.60
	2300	4.00	4.30	4.70
	2400	4.00	4.40	4.80
	2500	4.10	4.50	4.90
	2600	4.20	4.60	5.00
	2700	4.30	4.70	5.00
	2800	4.40	4.80	5.00
	2900	4.50	4.90	5.00
	3000	4.60	5.00	5.00
B&W 15x15⁽¹⁾	2100	3.60	4.00	4.20
	2200	3.70	4.10	4.20
	2300	3.80	4.20	4.50
	2400	3.90	4.30	4.70
	2500	4.00	4.40	4.70
	2600	4.10	4.40	4.90
	2700	4.20	4.50	5.00
	2800	4.20	4.70	5.00
	2900	4.30	4.70	5.00
	3000	4.40	4.70	5.00

- (1) When CCs that extend into the active fuel region are stored, the maximum planar average initial enrichment shall be reduced by 0.05 wt. % or the soluble boron concentration shall increased by 50 ppm.
- (2) When CCs that extend into the active fuel region are stored, the maximum planar average initial enrichment shall be reduced by 0.2 wt. %.
- (3) Enrichment limits are applicable when up to 8 damaged and/or failed fuel assemblies are loaded.
- (4) The fixed poison loading requirements as a function of basket type are specified in Table 1-1r.

Table 1-1r
B10 Specification for the NUHOMS®-24PTH Poison Plates

NUHOMS®-24PTH DSC Basket Type	Minimum B10 Areal Density, (grams/cm ²)	
	Borated Aluminum or MMC	Boral®
1A or 2A	0.007	0.009
1B or 2B	0.015	0.019
1C or 2C	0.032	0.040

Table 1-1s
(Deleted)

Table 1-1t
BWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-61BTH DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged or failed 7x7, 8x8, 9x9, 10x10 or 11x11 BWR assemblies. Damaged and/or failed fuel assemblies beyond the definitions contained below are not authorized for storage.
Fuel Damage	Damaged BWR fuel assemblies are assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of cladding damage in the fuel assembly, including non-cladding damage, is to be limited such that a fuel assembly needs to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Failed Fuel	<p>Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Failed fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly cannot be handled by normal means.</p> <p>Fuel debris and fuel rods that have been removed from a fuel assembly and placed in a rod storage basket are also considered as failed fuel. Loose fuel debris, not contained in a rod storage basket must be placed in a failed fuel can for storage, provided the size of the debris is larger than the failed fuel can screen mesh opening and it is located at a position of at least 10" above the top of the bottom shield plug of the DSC.</p> <p>Fuel debris may be associated with any type of UO₂ fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its content shall be less than 705 lb.</p>
RECONSTITUTED FUEL ASSEMBLIES:	
• Maximum Number of Irradiated Stainless Steel Rods in Reconstituted Assemblies per DSC	40
• Maximum Number of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly	10
• Maximum Number of Reconstituted Assemblies per DSC with unlimited number of low enriched UO ₂ rods or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods	61
Number of Intact Assemblies	≤ 61

(continued)

Table 1-1t
BWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-61BTH DSC

Number and Location of Damaged Assemblies	<p>Up to 61 damaged fuel assemblies, are authorized for storage in 61BTH DSC. If less than 61 damaged fuel assemblies are stored, balance may be intact or dummy assemblies.</p> <p>Damaged fuel assemblies are to be stored in accordance with Figure 1-25. The DSC basket cells that store damaged fuel assemblies are provided with top and bottom end caps to assure retrievability.</p>
Number and Location of Failed Assemblies	<p>Up to four failed fuel assemblies. Balance may be intact and/or damaged fuel assemblies, empty slots, or dummy assemblies depending on the specific heat load zoning configuration.</p> <p>Failed fuel assemblies are to be placed in Location A as shown in Figure 1-25. Failed fuel assembly/fuel debris is to be encapsulated in an individual FFC provided with a welded bottom closure and a removable top closure.</p>
Channels	Fuel may be stored with or without channels, channel fasteners, or finger springs.
<i>Fuel Cladding</i>	<i>Zirconium alloy clad fuel</i>
Maximum Assembly Weight with Channels	705 lbs
THERMAL/RADIOLOGICAL PARAMETERS:	
Allowable Heat Load Zoning Configurations for each Type 1 61BTH DSC	Per Figure 1-17 or Figure 1-18 or Figure 1-19 or Figure 1-20 or Figure 1-25a.
Allowable Heat Load Zoning Configurations for each Type 2 61BTH DSC:	Per Figure 1-17 or Figure 1-18 or Figure 1-19 or Figure 1-20 or Figure 1-21 or Figure 1-22 or Figure 1-23 or Figure 1-24 or Figure 1-25a or Figure 1-25b.
<i>Minimum Cooling Time</i>	<i>2 years</i>
<i>Maximum Burnup</i>	<i>62 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>0.5 wt. % U-235</i>
Maximum Lattice Average Initial Enrichment	Per Table 1-1v or Table 1-1w or Table 1-1w1 or Table 1-1x
Maximum Pellet Enrichment	5.0 wt. % U-235
Maximum Decay Heat Limits for Zones 1, 2, 3, 4, 5 and 6 Fuel	Per Figure 1-17 or Figure 1-18 or Figure 1-19 or Figure 1-20 or Figure 1-21 or Figure 1-22 or Figure 1-23 or Figure 1-24 or Figure 1-25a or Figure 1-25b
Decay Heat per DSC	≤ 22.0 kW for Type 1 DSC ≤ 31.2 kW for Type 2 DSC
Minimum B-10 Concentration in Poison Plates	Per Table 1-1v or Table 1-1w or Table 1-1w1 or Table 1-1x

Table 1-1u
(Not Used)

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Table 1-1v
Maximum Fuel Assembly Lattice Average Initial Enrichment v/s Minimum B-10
Requirements for the NUHOMS®-61BTH DSC Poison Plates (Intact Fuel)

61BTH DSC Type	Basket Type	Maximum Lattice Average Enrichment (wt. % U-235) ⁽¹⁾	Minimum B-10 Areal Density, (grams/cm ²)	
			Borated Aluminum/MMC	Boral®
1	A	3.7	0.021	0.025
	B	4.1	0.032	0.038
	C	4.4	0.040	0.048
	D	4.6	0.048	0.058
	E	4.8	0.055	0.066
	F	5.0	0.062	0.075
2	A	3.7	0.022	0.027
	B	4.1	0.032	0.038
	C	4.4	0.042	0.050
	D	4.6	0.048	0.058
	E	4.8	0.055	0.066
	F	5.0 ⁽¹⁾	0.062	0.075

Note:

- 1) For ATRIUM 11 fuel assemblies, the U-235 wt. % enrichment is reduced by 0.55%. The ATRIUM 11 fuel assemblies are authorized for storage in the Type 2F DSC only.

Table 1-1w
Maximum Fuel Assembly Lattice Average Initial Enrichment v/s Minimum B-10
Requirements for the NUHOMS®-61BTH DSC Poison Plates (Damaged Fuel)

61BTH DSC Type	Basket Type	Maximum Lattice Average Enrichment (wt. % U-235)		Minimum B-10 Areal Density, (grams/cm ²)	
		Up to 4 Damaged Assemblies ⁽¹⁾	Five or More Damaged Assemblies ⁽¹⁾ (16 Maximum)	Borated Aluminum/MMC	Boral®
1	A	3.7	2.80	0.021	0.025
	B	4.1	3.10	0.032	0.038
	C	4.4	3.20	0.040	0.048
	D	4.6	3.40	0.048	0.058
	E	4.8	3.50	0.055	0.066
	F	5.0	3.60	0.062	0.075
2	A	3.7	2.80	0.022	0.027
	B	4.1	3.10	0.032	0.038
	C	4.4	3.20	0.042	0.050
	D	4.6	3.40	0.048	0.058
	E	4.8	3.50	0.055	0.066
	F	5.0 ^(2, 3)	3.60	0.062	0.075

Notes:

- 1) See Figure 1-25 for the location of damaged fuel assemblies within the 61BTH DSC.
- 2) ATRIUM 11 fuel assemblies are authorized for storage only in the Type 2F basket with a maximum of 4 damaged fuel assemblies.
- 3) For ATRIUM 11 fuel assemblies, the U-235 wt. % enrichment is reduced by 0.55%.

Table 1-1w1
BWR Fuel Assembly Initial Lattice Average Initial Enrichment v/s Minimum B-10
Requirements for the NUHOMS®-61BTH DSC Poison Plates (Failed and Damaged Fuel)

61BTH DSC Type	Basket Type	Maximum Lattice Average Enrichment (wt. % U-235)		Minimum B-10 Areal Density (grams/cm ²)	
		Up to 4 Failed Assemblies (Corner Locations) ^(1, 2)	Up to 4 Failed Assemblies (Corner Locations) and up to 12 Damaged Assemblies (Interior Locations) ^(1, 2)	Borated Aluminum/MMC	Boral®
2	A	3.7	2.8	0.022	0.027
	B	4.0	3.1	0.032	0.038
	C	4.4	3.2	0.042	0.050
	D	4.6	3.4	0.048	0.058
	E	4.8	3.4	0.055	0.066
	F	5.0	3.5	0.062	0.075

Notes:

- 1) See Figure 1-25 for the locations of the failed and damaged assemblies within the 61BTH DSC.
- 2) Failed ATRIUM 11 fuel assemblies are not authorized for storage in the 61BTH DSC.

Table 1-1x
BWR Fuel Assembly Initial Lattice Average Enrichments v/s Minimum B-10 Requirements
for the NUHOMS® -61BTH DSC Poison Plates for > 16 Damaged Fuel Assemblies

61BTH DSC Type	Poison ID	Up to 57 Damaged Fuel at 3.30 wt. % U-235		Minimum B-10 Content (grams/cm ²)		
		Remaining Four Intact Assemblies ⁽¹⁾	Remaining Four Damaged Assemblies ⁽¹⁾	Utilized in this Analysis	Specified for 90% Credit	Specified for 75% Credit
2	A	-	-	-	-	-
	B	-	-	-	-	-
	C	-	-	-	-	-
	D	5.00	4.20	0.043	0.048	0.058
	E	5.00	4.20	0.050	0.055	0.066
	F	5.00	4.20	0.056	0.062	0.075

Note 1: See Figure 1-25 for the locations of the damaged assemblies within the 61BTH DSC.

**Table 1-1y
(Not Used)**

**Table 1-1z
(Not Used)**

Table 1-1aa
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-32PTH1 DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged or failed unconsolidated B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14, WE 14x14 and CE 16x16 class PWR assemblies (with or without CCs). Damaged and/or failed fuel assemblies beyond the definitions contained below are not authorized for storage.
Fuel Damage	Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods, fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that the fuel assembly will still be able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Failed Fuel	Failed fuel is defined as fuel rods that have been removed from a fuel assembly, breached rods, grossly breached rods, and other defective rods. Fuel rods that have been removed from a fuel assembly may be placed in a secondary container, such as a rod storage basket. Individual fuel rods that are not failed can be stored in a failed fuel canister (FFC) without a secondary container such as a rod storage basket. The maximum number of fuel rods that may be stored in the FFC is 100 with a total uranium loading limited to 2.50 kg initial uranium per rod.
Reconstituted Fuel Assemblies: <ul style="list-style-type: none"> Maximum Number of Irradiated Stainless Steel Rods in Reconstituted Assemblies per DSC Maximum Number of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly Maximum Number of Reconstituted Assemblies per DSC with unlimited number of low enriched UO₂ rods, or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods 	40 10 32
Control Components (CCs)	<ul style="list-style-type: none"> Up to 32 CCs are authorized for storage in 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs. Authorized CCs include burnable poison rod assemblies (BPRAs), thimble plug assemblies (TPAs), control rod assemblies (CRAs), rod cluster control assemblies (RCCAs), axial power shaping rod assemblies (APSRAs), orifice rod assemblies (ORAs), vibration suppression inserts (VSIs), neutron source assemblies (NSAs) and neutron sources. Non-fuel hardware that are positioned within the fuel assembly after the fuel assembly is discharged from the core such as guide tube or instrument tube tie rods or anchors, guide tube inserts, BPRA spacer plates or devices that are positioned and operated within the fuel assembly during reactor operation such as those listed above are also considered as CCs. Design basis radiological characteristics for the CCs are listed in Table 1-1ee.
Number of Intact Assemblies	≤ 32

(continued)

Table 1-1aa
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-32PTH1 DSC

Number and Location of Damaged Assemblies	Up to 16 damaged fuel assemblies with balance intact fuel assemblies, or dummy assemblies are authorized for storage in 32PTH1 DSC. Damaged fuel assemblies are to be placed as shown in Figures 1-26 through 1-28 and Figure 1-28a. The DSC basket cells which store damaged fuel assemblies are provided with top and bottom end caps.
Number and Location of Failed Assemblies	Up to 16 failed fuel assemblies. Balance to be intact and/or damaged fuel assemblies, empty slots, or dummy assemblies depending on the specific head load zoning configurations. Failed fuel assemblies are to be placed in Location 5a as shown in Figure 1-28a or in locations denoted by ** as shown in Figure 1-28. Failed fuel rods are to be encapsulated in an individual FFC provided with a welded bottom closure and a removable top closure. The maximum number of failed fuel rods per FFC that may be stored is 100 with a total uranium loading limited to 2.50 kg initial uranium per rod.
Maximum Assembly plus CC Weight	1715 lbs
<i>Fuel Cladding</i>	<i>Zirconium alloy clad fuel</i>
THERMAL/RADIOLOGICAL PARAMETERS: <i>Allowable heat load zoning configurations</i>	<i>Figure 1-26, Figure 1-27, Figure 1-28, Figure 1-28a, Figure 1-28b, or Figure 1-28c</i>
Maximum Planar Average Initial Fuel Enrichment	Per Table 1-1cc or Table 1-1dd or Table 1-1dd1.
Decay Heat per DSC	≤ 40.8 kW for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs (Type 1 Basket).
	≤ 31.2 kW for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs (Type 2 Basket).
Minimum Boron Loading	Per Table 1-1cc or Table 1-1dd or Table 1-1dd1.
<i>Minimum Cooling Time</i>	<i>2 years</i>
<i>Maximum Burnup</i>	<i>62 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>0.2 wt.% U-235</i>

Table 1-1bb
(Not Used)

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Table 1-1cc
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for
32PTH1 DSC (Intact Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)					
	Minimum Soluble Boron (ppm)	Basket Type ⁽¹⁾				
		1A or 2A	1B or 2B	1C or 2C	1D or 2D	1E or 2E
WE 17x17 Assembly Class⁽⁴⁾	2000	3.40	3.80	3.90	4.10	4.30
	2300	3.70	4.00	4.20	4.40	4.70
	2400	3.70	4.10	4.30	4.50	4.80
	2500	3.80	4.20	4.40	4.60	4.90
	2800	4.00	4.50	4.70	5.00	5.00
	3000	4.20	4.60	4.80	5.00	5.00
CE 16x16 Assembly Class⁽⁵⁾	2000	3.90	4.30	4.50	4.80	5.00
	2300	4.10	4.60	4.80	5.00	5.00
	2400	4.20	4.70	4.90	5.00	5.00
	2500	4.30	4.80	5.00	5.00	5.00
	2800	4.60	5.00	5.00	5.00	5.00
	3000	4.70	5.00	5.00	5.00	5.00
BW 15x15 Assembly Class⁽⁵⁾	2000	3.30	3.60	3.80	4.00	4.20
	2300	3.50	3.90	4.10	4.30	4.60
	2400	3.60	4.00	4.20	4.40	4.70
	2500	3.70	4.10	4.30	4.50	4.80
	2800	3.90	4.30	4.50	4.80	5.00
	3000	4.10	4.50	4.70	5.00	5.00
CE 15x15 Assembly Class⁽⁵⁾	2000	3.50	3.90	4.00	4.20	4.40
	2300	3.80	4.10	4.30	4.60	4.80
	2400	3.90	4.30	4.40	4.70	4.90
	2500	3.90	4.35	4.50	4.80	5.00
	2800	4.20	4.60	4.80	5.00	5.00
	3000	4.30	4.80	5.00	5.00	5.00

(continued)

Table 1-1cc
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for
32PTH1 DSC (Intact Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)					
	Minimum Soluble Boron (ppm)	Basket Type ⁽¹⁾				
		1A or 2A	1B or 2B	1C or 2C	1D or 2D	1E or 2E
WE 15x15 Assembly Class⁽⁵⁾	2000	3.50	3.80	3.90	4.20	4.40
	2300	3.70	4.10	4.20	4.50	4.80
	2400	3.80	4.20	4.40	4.60	4.90
	2500	3.90	4.30	4.50	4.70	5.00
	2800	4.10	4.50	4.70	5.00	5.00
	3000	4.20	4.70	4.90	5.00	5.00
CE 14x14 Assembly Class⁽⁶⁾	2000	3.90	4.40	4.60	4.90	5.00
	2300	4.20	4.70	5.00	5.00	5.00
	2400	4.30	4.80	5.00	5.00	5.00
	2500	4.40	5.00	5.00	5.00	5.00
	2800	4.60	5.00	5.00	5.00	5.00
	3000	4.80	5.00	5.00	5.00	5.00
WE 14x14 Assembly Class⁽⁷⁾	2000	4.20	4.70	4.90	5.00	5.00
	2300	4.50	5.00	5.00	5.00	5.00
	2400	4.60	5.00	5.00	5.00	5.00
	2500	4.70	5.00	5.00	5.00	5.00
	2800	5.00	5.00	5.00	5.00	5.00
	3000	5.00	5.00	5.00	5.00	5.00

Notes:

- (1) The fixed poison loading requirements as a function of Basket Type are specified in Table 1-1ff.
- (2) Not used.
- (3) Not used.
- (4) Reduce Maximum Planar Average Initial Enrichment by 0.05 wt. % U-235 for assemblies with CCs that extend into the active fuel region.
- (5) Reduce Maximum Planar Average Initial Enrichment by 0.10 wt. % U-235 for assemblies with CCs that extend into the active fuel region.
- (6) Reduce Maximum Planar Average Initial Enrichment by 0.25 wt. % U-235 for assemblies with CCs that extend into the active fuel region.
- (7) No reduction in Maximum Planar Average Initial Enrichment required for assemblies with CCs that extend into the active fuel region.

Table 1-1dd
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for
32PTH1 DSC (Damaged and Failed ⁽³⁾ Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)					
	Minimum Soluble Boron (ppm)	Basket Type ⁽¹⁾				
		1A or 2A	1B or 2B	1C or 2C	1D or 2D	1E or 2E
WE 17x17 Assembly Class (without CCs) ⁽²⁾	2000	3.40	3.70	3.80	4.05	4.25
	2300	3.60	3.95	4.10	4.35	4.65
	2400	3.70	4.05	4.20	4.45	4.75
	2500	3.75	4.15	4.30	4.55	4.85
	2800	4.00	4.40	4.60	4.85	5.00
	3000	4.15	4.55	4.75	5.00	5.00
WE 17x17 Assembly Class (with CCs) ⁽²⁾	2000	3.35	3.65	3.75	4.00	4.20
	2300	3.55	3.90	4.05	4.30	4.55
	2400	3.65	4.00	4.15	4.40	4.70
	2500	3.70	4.10	4.25	4.50	4.75
	2800	3.95	4.35	4.55	4.80	5.00
	3000	4.10	4.50	4.70	5.00	5.00
CE 16x16 Assembly Class (without CCs)	2000	3.65	4.05	4.20	4.50	4.75
	2300	3.90	4.30	4.50	4.80	5.00
	2400	4.00	4.40	4.60	4.90	5.00
	2500	4.05	4.50	4.70	5.00	5.00
	2800	4.30	4.80	5.00	5.00	5.00
	3000	4.50	4.95	5.00	5.00	5.00
CE 16x16 Assembly Class (with CCs)	2000	3.60	3.95	4.10	4.40	4.65
	2300	3.80	4.20	4.40	4.70	4.90
	2400	3.90	4.30	4.50	4.80	5.00
	2500	4.00	4.40	4.60	4.80	5.00
	2800	4.20	4.70	4.90	5.00	5.00
	3000	4.40	4.85	5.00	5.00	5.00
BW 15x15 Assembly Class (without CCs)	2000	3.30	3.60	3.75	3.95	4.20
	2300	3.50	3.90	4.05	4.30	4.50
	2400	3.60	4.00	4.15	4.40	4.65
	2500	3.65	4.05	4.20	4.50	4.75
	2800	3.90	4.30	4.50	4.75	5.00
	3000	4.05	4.45	4.65	5.00	5.00

(continued)

Table 1-1dd
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for
32PTH1 DSC (Damaged and Failed ⁽³⁾ Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)					
	Minimum Soluble Boron (ppm)	Basket Type ⁽¹⁾				
		1A or 2A	1B or 2B	1C or 2C	1D or 2D	1E or 2E
BW 15x15 Assembly Class (with CCs) ⁽²⁾	2000	3.20	3.50	3.65	3.90	4.10
	2300	3.40	3.80	3.95	4.20	4.40
	2400	3.50	3.90	4.05	4.30	4.55
	2500	3.60	4.00	4.15	4.40	4.65
	2800	3.80	4.20	4.40	4.65	4.90
	3000	3.95	4.40	4.55	4.90	5.00
CE 15x15 Assembly Class (without CCs) ⁽²⁾	2000	3.35	3.70	3.80	4.05	4.25
	2300	3.60	3.95	4.10	4.30	4.60
	2400	3.65	4.05	4.20	4.45	4.70
	2500	3.75	4.15	4.30	4.55	4.80
	2800	4.00	4.40	4.60	4.85	5.00
	3000	4.15	4.55	4.75	5.00	5.00
CE 15x15 Assembly Class (with CCs) ⁽²⁾	2000	3.30	3.65	3.80	4.00	4.20
	2300	3.55	3.90	4.05	4.30	4.55
	2400	3.65	4.00	4.15	4.45	4.65
	2500	3.70	4.10	4.25	4.50	4.80
	2800	3.95	4.35	4.55	4.80	5.00
	3000	4.10	4.55	4.70	5.00	5.00
WE 15x15 Assembly Class (without CCs)	2000	3.40	3.75	3.90	4.15	4.30
	2300	3.65	4.00	4.20	4.45	4.70
	2400	3.75	4.10	4.30	4.55	4.80
	2500	3.80	4.20	4.40	4.65	4.90
	2800	4.05	4.45	4.60	4.90	5.00
	3000	4.20	4.60	4.80	5.00	5.00

(continued)

Table 1-1dd
Maximum Planar Average Initial Enrichment v/s Neutron Poison Requirements for
32PTH1 DSC (Damaged and Failed ⁽³⁾ Fuel)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)					
	Minimum Soluble Boron (ppm)	Basket Type ⁽¹⁾				
		1A or 2A	1B or 2B	1C or 2C	1D or 2D	1E or 2E
WE 15x15 Assembly Class (with CCs)	2000	3.35	3.65	3.80	4.00	4.20
	2300	3.55	3.90	4.10	4.35	4.60
	2400	3.65	4.00	4.20	4.45	4.70
	2500	3.70	4.10	4.30	4.55	4.80
	2800	3.95	4.35	4.50	4.80	5.00
	3000	4.10	4.50	4.70	5.00	5.00
CE 14x14 Assembly Class (without CCs) ⁽²⁾	2000	3.70	4.10	4.30	4.60	4.85
	2300	3.95	4.40	4.60	4.95	5.00
	2400	4.05	4.50	4.70	5.00	5.00
	2500	4.15	4.60	4.80	5.00	5.00
	2800	4.40	4.90	5.00	5.00	5.00
	3000	4.55	5.00	5.00	5.00	5.00
CE 14x14 Assembly Class (with CCs) ⁽²⁾	2000	3.55	3.95	4.10	4.35	4.60
	2300	3.80	4.20	4.40	4.70	4.90
	2400	3.9	4.30	4.50	4.80	5.00
	2500	4.00	4.40	4.60	4.90	5.00
	2800	4.20	4.65	4.90	5.00	5.00
	3000	4.35	4.85	5.00	5.00	5.00
WE 14x14 Assembly Class (without CCs) ⁽²⁾	2000	3.75	4.15	4.30	4.60	4.85
	2300	3.95	4.45	4.65	5.00	5.00
	2400	4.05	4.55	4.75	5.00	5.00
	2500	4.15	4.65	4.85	5.00	5.00
	2800	4.40	4.90	5.00	5.00	5.00
	3000	4.60	5.00	5.00	5.00	5.00
WE 14x14 Assembly Class (with CCs) ⁽²⁾	2000	3.70	4.10	4.20	4.50	4.75
	2300	3.90	4.40	4.60	4.90	5.00
	2400	4.00	4.50	4.65	5.00	5.00
	2500	4.10	4.55	4.80	5.00	5.00
	2800	4.30	4.80	5.00	5.00	5.00
	3000	4.50	5.00	5.00	5.00	5.00

Note:

- (1) The fixed poison loading requirements as a function of Basket Type are specified in Table 1-1ff.
- (2) The fixed poison requirements for this assembly class are also applicable to storage of failed fuel in rod storage baskets (RSBs).
- (3) Up to four failed fuel cans are authorized using these requirements. The requirements for greater than four and up to sixteen failed fuel cans are specified in Table 1-1dd1.

Table 1-1dd1
Maximum Planar Average Initial Enrichment for 32PTH1 DSC (Up to 16 FFCs – 16 empty slots)

Fuel Assembly Class	Maximum Planar Average Initial Enrichment (wt. % U-235) as a Function of Soluble Boron Concentration and Basket Type (Fixed Poison Loading)					
	Minimum Soluble Boron (ppm)	Basket Type ⁽¹⁾				
		1A or 2A	1B or 2B	1C or 2C	1D or 2D	1E or 2E
CE 14x14 Assembly Class	2400	NE	NE	5.00	5.00	5.00
WE 14x14 Assembly Class						
BW 15x15 Assembly Class	2500	NE	NE	5.00	5.00	5.00
WE 15x15 Assembly Class						
CE 15x15 Assembly Class	2800	NE	NE	5.00	5.00	5.00
CE 16x16 Assembly Class						
WE 17x17 Assembly Class	3000	NE	NE	5.00	5.00	5.00

NE = Not Evaluated

Notes:

- (1) NE = Not Evaluated
- (2) The fixed poison loading requirements as a function of Basket Type are specified in Table 1-1ff.
- (3) Up to sixteen failed fuel cans are authorized.

Table 1-1ee
Radiological Characteristics for Control Components Stored in the NUHOMS®-32PT and
NUHOMS®-32PTH1 DSCs

Parameter	BPRAs, NSAs, CRAs, RCCAs, VSIs, Neutron Sources, and APSRAs	TPAs and ORAs
Maximum Gamma Source (y/sec/DSC)	1.25E+15	1.31E+14

Note: NSAs and Neutron Sources shall only be stored in the interior compartments of the basket. Interior compartments are those that are completely surrounded by other compartments, including the corners. There are twelve interior compartments in the 32PT and 32PTH1 DSCs.

Table 1-1ff
B10 Specification for the NUHOMS®-32PTH1 Poison Plates

NUHOMS®-32PTH1 DSC Basket Type	Minimum B10 Areal Density, (grams/cm ²)	
	Borated Aluminum or MMC	Boral®
1A or 2A	0.007	0.009
1B or 2B	0.015	0.019
1C or 2C	0.020	0.025
1D or 2D	0.032	N/A
1E or 2E	0.050	N/A

Table 1-1gg
BWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-69BTH DSC

PHYSICAL PARAMETERS:	
Fuel class	Intact or damaged 7x7, 8x8, 9x9 or 10x10 BWR assemblies. Damaged fuel assemblies beyond the definition contained below are not authorized for storage.
Fuel damage	Damaged BWR fuel assemblies are assemblies containing fuel rods with known, suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that the fuel assembly will still be able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
RECONSTITUTED FUEL ASSEMBLIES:	
• Maximum Number of Irradiated Stainless Steel Rods in Reconstituted Assemblies per DSC	40
• Maximum Number of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly	10
• Maximum Number of Reconstituted Assemblies per DSC with unlimited number of low enriched UO ₂ rods or Zr rods or Zr pellets or Unirradiated Stainless Steel Rods	69
Number of intact assemblies	≤ 69
Number and location of damaged assemblies	Up to 24 damaged fuel assemblies, with balance intact or dummy assemblies, are authorized for storage in 69BTH DSC. Damaged fuel assemblies may only be stored in the locations shown in Figure 1-37. The DSC basket cells which store damaged fuel assemblies are provided with top and bottom end caps.
Channels	Fuel may be stored with or without channels, channel fasteners or finger springs.
Maximum assembly weight including channels	705 lb
<i>Fuel Cladding</i>	<i>Zirconium alloy clad fuel</i>

(continued)

Table 1-1gg
BWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-69BTH DSC

THERMAL/RADIOLOGICAL PARAMETERS:	
Allowable Heat Load Zoning Configurations for each 69BTH DSC	Per Figure 1-31 or Figure 1-32 or Figure 1-33 or Figure 1-34 or Figure 1-35 or Figure 1-36 or Figure 1-38.
Maximum Lattice Average Initial Enrichment	Per Table 1-1jj or Table 1-1kk
Maximum Pellet Enrichment	5.0 wt. % U-235
Maximum decay heat limits for HLZCs 1, 2, 3, 4, 5, 6 and 7	Per Figure 1-31 or Figure 1-32 or Figure 1-33 or Figure 1-34 or Figure 1-35 or Figure 1-36 or Figure 1-38.
Decay heat per DSC	≤ 35.0 kW
Minimum B-10 Concentration in Poison Plates	Per Table 1-1jj or Table 1-1kk
<i>Minimum Cooling Time</i>	<i>3 years</i>
<i>Maximum Burnup</i>	<i>62 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>0.5 wt.% U-235</i>

Table 1-1hh
Not Used

Table 1-1ii
(Not Used)

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Table 1-1jj
BWR Fuel Assembly Lattice Average Initial Enrichment vs Minimum B10 Requirements
for the NUHOMS®-69BTH DSC Poison Plates (Intact Fuel)

Basket Type	Maximum Lattice Average Enrichment ⁽¹⁾ (wt. % U-235)	Minimum B10 Areal Density (grams/cm ²)	
		Borated Aluminum/MMC	Boral®
A	3.70	0.021	0.025
B	4.10	0.031	0.037
C	4.40	0.039	0.047
D	4.60	0.046	0.055
E	4.80	0.053	0.064
F	5.00	0.061	0.073

(1) For LaCrosse fuel assemblies, the enrichment shall be reduced by 0.1 wt. % U-235.

Table 1-1kk
BWR Fuel Assembly Lattice Average Initial Enrichment vs Minimum B10 Requirements for
the NUHOMS®-69BTH DSC Poison Plates (Damaged Fuel)

Basket ID	Maximum Lattice Average Initial Enrichment ⁽¹⁾ (wt.% U-235)				Minimum B10 Areal Density (grams/cm ²)	
	Intact Assemblies	Up to 4 Damaged Assemblies ⁽²⁾	5 to 8 Damaged Assemblies ⁽²⁾	9 to 24 Damaged Assemblies ⁽²⁾	Borated Aluminum/MMC	Boral®
A	3.70	3.70	3.30	2.80	0.021	0.025
B	4.10	4.10	3.60	3.00	0.031	0.037
C	4.40	4.20	3.60	3.10	0.039	0.047
D	4.60	4.40	3.70	3.20	0.046	0.055
E	4.80	4.40	3.70	3.20	0.053	0.064
F	5.00	4.80	3.90	3.40	0.061	0.073

⁽¹⁾ For LaCrosse fuel assemblies, the enrichment shall be reduced by 0.1 wt. % U-235.

⁽²⁾ Allowable locations for damaged assemblies within the 69BTH basket are per Figure 1-37.

Table 1-1II
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-37PTH DSC

PHYSICAL PARAMETERS:	
Fuel Class	Intact or damaged unconsolidated WE 17x17, CE 16X16, CE 15x15, WE 15x15, CE 14x14, and WE 14x14 class PWR assemblies (with or without control components). Damaged fuel assemblies beyond the definition contained below are not authorized for storage.
Fuel Damage	Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods, fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly, including non-cladding damage, is to be limited such that a fuel assembly is able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Reconstituted Fuel Assemblies:	
<ul style="list-style-type: none"> Maximum Number of Irradiated Stainless Steel Rods in Reconstituted Assemblies per DSC 	40
<ul style="list-style-type: none"> Maximum Number of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly 	10
<ul style="list-style-type: none"> Maximum Number of Reconstituted Assemblies per DSC with Unlimited Number of Low Enriched UO₂ Rods, or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods 	37
Control Components (CCs)	<ul style="list-style-type: none"> Up to 37 CCs are authorized for storage in 37PTH-S, and 37PTH-M DSCs. Authorized CCs include burnable poison rod assemblies (BPRAs), thimble plug assemblies (TPAs), control rod assemblies (CRAs), rod cluster control assemblies (RCCAs), axial power shaping rod assemblies (APSRAs), orifice rod assemblies (ORAs), neutron source assemblies (NSAs), vibration suppression inserts (VSIs) and neutron sources. Non-fuel hardware that are positioned within the fuel assembly after the fuel assembly is discharged from the core such as guide tube or instrument tube tie rods or anchors, guide tube inserts, BPRA spacer plates or devices that are positioned and operated within the fuel assembly during reactor operation such as those listed above are also considered as CCs. Design basis radiological characteristics for the CCs are listed in Table 1-1qq.

(continued)

Table 1-1II
PWR Fuel Specification for the Fuel to be Stored in the NUHOMS®-37PTH DSC

Number of Intact Assemblies	≤ 37
Number and Location of Damaged Assemblies	Up to four damaged fuel assemblies. Balance may be intact fuel assemblies, or dummy assemblies that are authorized for storage in 37PTH DSC. Damaged fuel assemblies are to be placed in the outer 4 locations as shown in Figure 1-39 and Figure 1-40. The DSC basket cells which store damaged fuel assemblies are provided with top and bottom end caps.
Maximum Assembly plus CC Weight	1665 lbs
<i>Fuel Cladding</i>	<i>Zirconium alloy clad fuel</i>
Thermal/Radiological Parameters: <i>Allowable heat load zoning configurations</i>	<i>Figure 1-39 or Figure 1-40.</i>
Maximum Planar Average Initial Fuel Enrichment	Per Table 1-100 and Table 1-1pp, Figure 1-41 and Figure 1-42
Decay Heat per DSC	≤ 30.0 kW
Minimum Boron Loading	Per Table 1-100 and Table 1-1pp
<i>Minimum Cooling Time</i>	<i>2 years</i>
<i>Maximum Burnup</i>	<i>62 GWd/MTU</i>
<i>Minimum Assembly Average Initial Enrichment</i>	<i>0.2 wt.% U-235</i>

**Table 1-1mm
Not Used**

Table 1-1nn
(Not Used)

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Table 1-100
Maximum Planar Average Initial Enrichment vs. Minimum Soluble Boron Concentration
for 37PTH DSC (Intact and Damaged Fuel)

Fuel Assembly Class	Maximum Planar Average Enrichment ⁽²⁾⁽³⁾ (wt. % U-235)		
	Minimum Soluble Boron Concentration (PPM)	Without CCs	With CCs
CE 14x14	2000	4.50	4.35 ⁽¹⁾
	2300	4.90	4.65
	2400	5.00	4.75
	2500	5.00	4.85
	2800	5.00	5.00
	3000	5.00	5.00
CE 15x15	2000	4.05	4.00 ⁽¹⁾
	2300	4.35	4.30 ⁽¹⁾
	2400	4.45	4.40
	2500	4.55	4.50
	2800	4.85 ⁽¹⁾	4.75
	3000	5.00	4.95
CE 16x16	2000	4.40	4.30
	2300	4.75	4.60
	2400	4.90 ⁽¹⁾	4.75
	2500	5.00 ⁽¹⁾	4.85
	2800	5.00	5.00
	3000	5.00	5.00
WE 14x14	2000	4.75	4.75
	2300	5.00	5.00
	2400	5.00	5.00
	2500	5.00	5.00
	2800	5.00	5.00
	3000	5.00	5.00
WE 15x15	2000	3.90	3.85
	2300	4.20	4.15
	2400	4.30	4.20
	2500	4.40	4.30
	2800	4.70	4.60
	3000	4.85	4.75
WE 17x17	2000	3.90	3.85
	2300	4.20	4.15
	2400	4.30	4.25
	2500	4.40	4.35
	2800	4.65	4.60
	3000	4.85	4.80

⁽¹⁾ For damaged fuel assemblies, the maximum planar average initial enrichment is reduced by 0.05 wt. % U-235.

⁽²⁾ There is only one basket type. The fixed poison loading is per Table 1-1rr.

⁽³⁾ Linear interpolation is allowed between adjacent maximum planar average initial enrichments and soluble boron concentration levels.

Table 1-1pp
Maximum Planar Average Initial Enrichment versus Minimum Soluble Boron
Concentration for 37PTH DSC and Poison Rod Assemblies
(Intact and Damaged Fuel)

Fuel Assembly Class	Maximum Planar Average Enrichment ⁽²⁾ wt% U-235)		
	Minimum Soluble Boron Concentration (PPM)	Without CCs	With CCs
WE 17x17 (Nine PRAs)	2000	4.30	4.25
	2300	4.65	4.60
	2400	4.75	4.70
	2500	4.85	4.80
	2600	5.00 ⁽¹⁾	4.90
WE 17x17 (Five PRAs)	2600	4.80 ⁽¹⁾	4.75 ⁽¹⁾

Notes:

1. For damaged fuel assemblies, the maximum allowed initial U-235 enrichment is reduced by 0.05 wt%.
2. Linear interpolation is allowed between adjacent maximum planar average initial enrichments and soluble boron concentration levels.

Table 1-1qq
Radiological Characteristics for Control Components Stored in the NUHOMS®-37PTH DSC

Parameter	BPRAs, NSAs, CRAs, RCCAs, VSIs, APSRAs and Neutron Sources	TPAs and ORAs
Maximum gamma source (γ/sec/DSC)	1.45E+15	1.52E+14

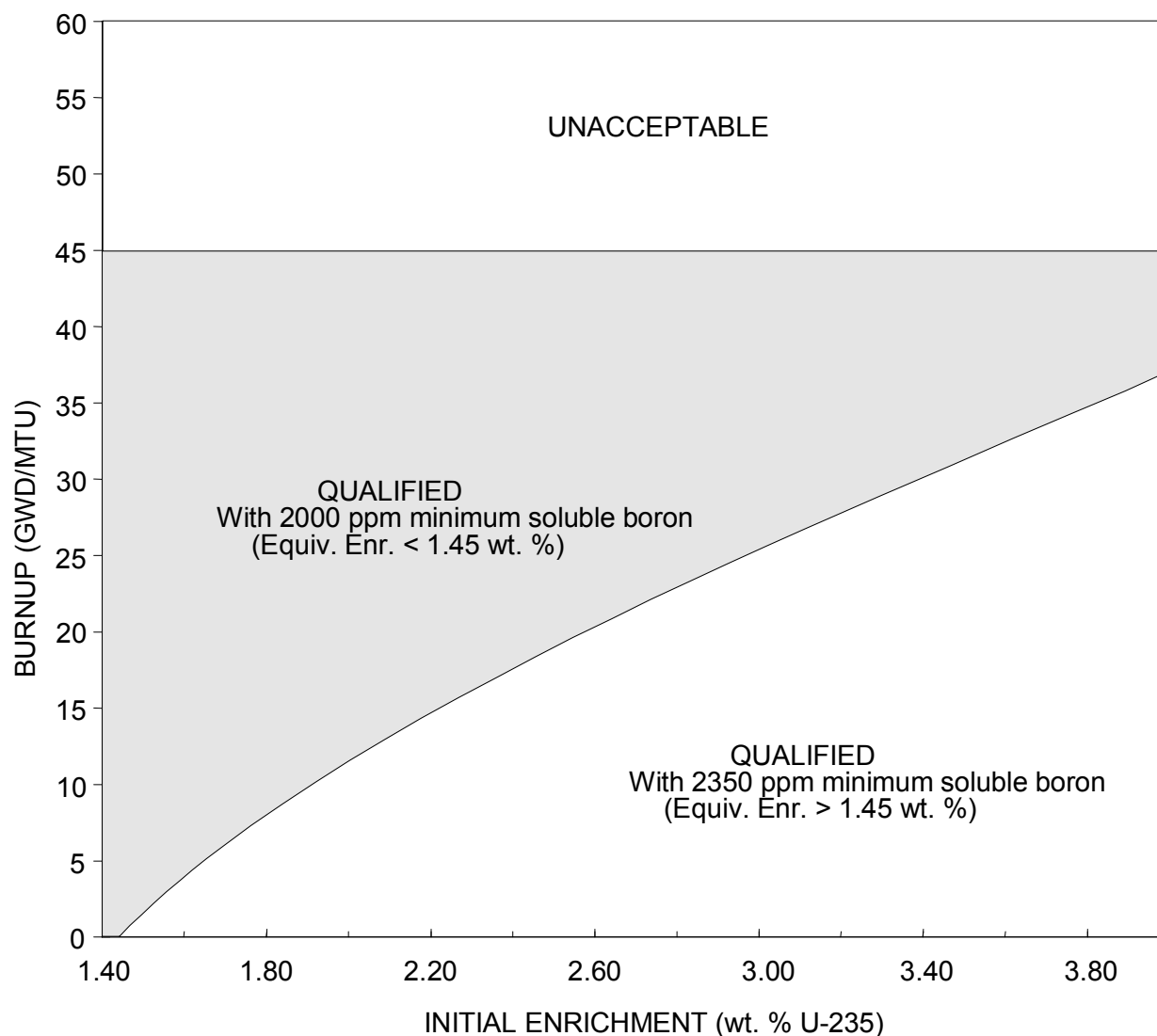
Note: NSAs and neutron sources shall only be stored in the interior compartments of the basket. Interior compartments are those compartments that are completely surrounded by other compartments, including the corners. There are thirteen interior compartments in the 37PTH DSC.

Table 1-1rr
B10 Specification for the NUHOMS®-37PTH Poison Plates

37PTH DSC Type	Number of PRAs	Minimum B10 Areal Density for Boral® (grams/cm²)	Minimum B10 Areal Density for Borated Aluminum or MMC (grams/cm²)
37PTH-M or 37PTH-S	0	0.024	0.020
	5		
	9		

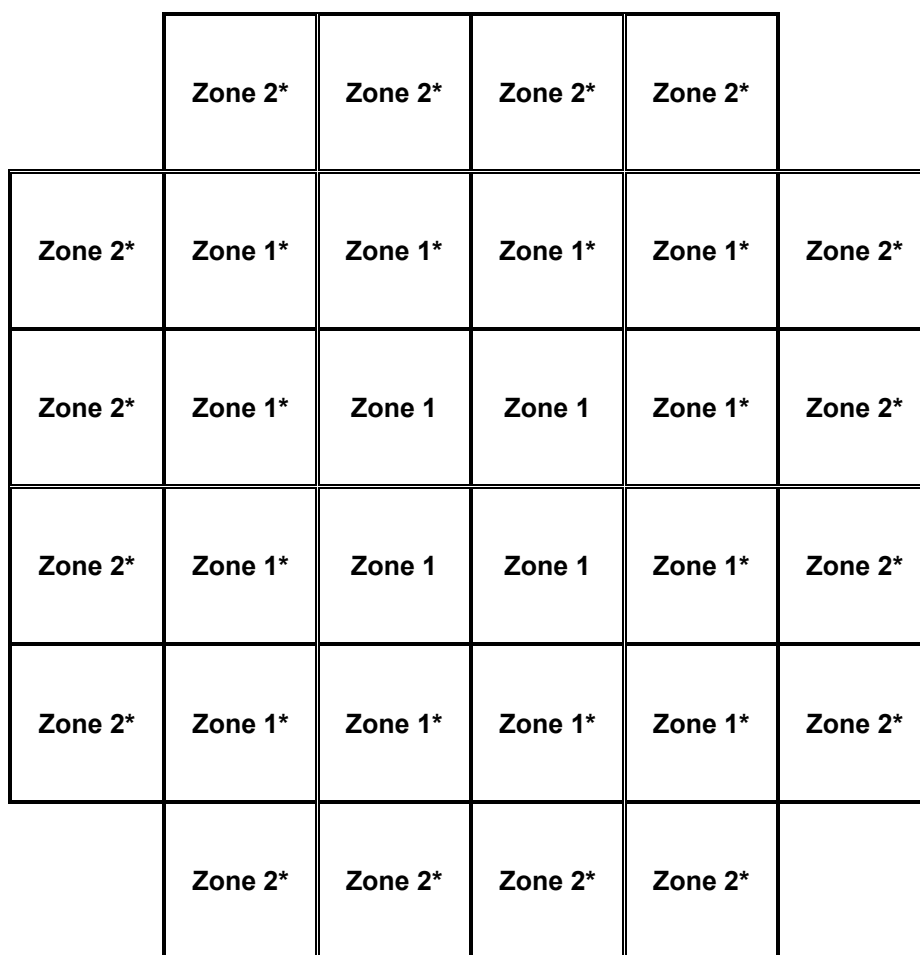
Table 1-1ss
B-10 Specification for the NUHOMS® - 37PTH PRAs

37PTH DSC Type	Number of PRAs	Minimum B-10 Content per Rod (g/cm)
37PTH-M or 37PTH-S	5	0.088
	9	



Note: The maximum planar average initial enrichment is specified as “initial enrichment.”

Figure 1-1
PWR Fuel Criticality Acceptance Curve for the 24P DSC



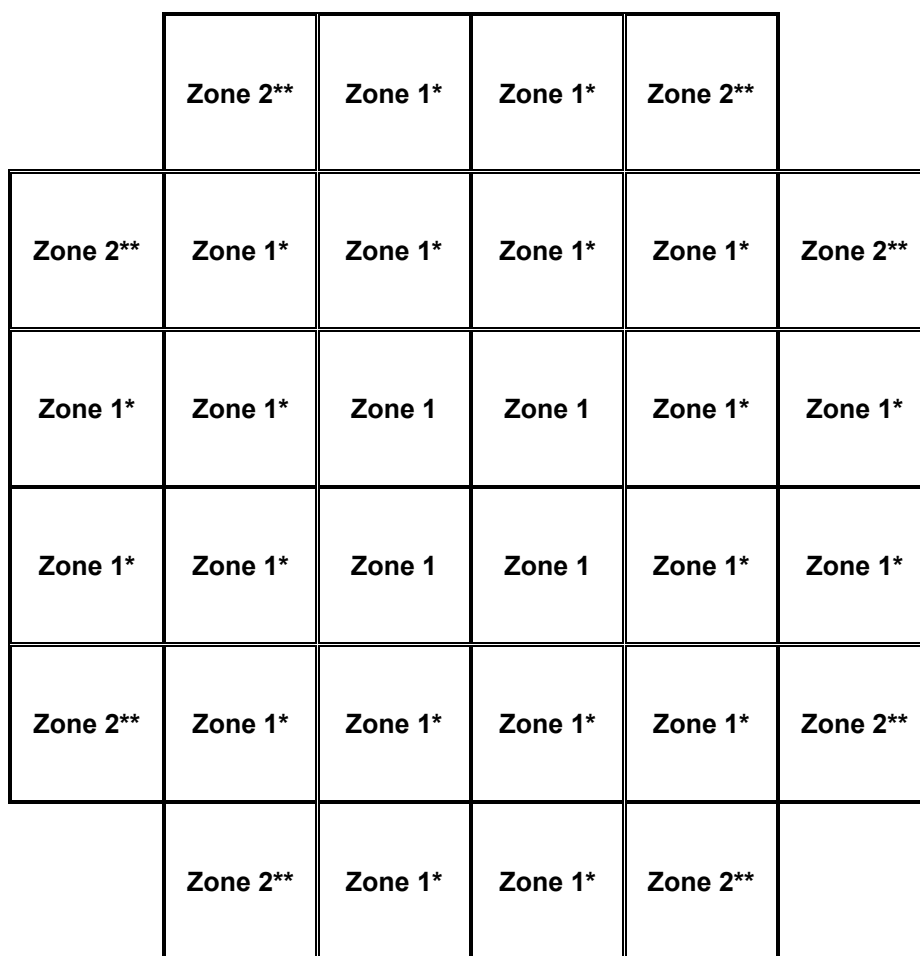
* Denotes locations where intact or damaged FAs may be stored.

	Zone 1	Zone 2
Max. Decay Heat / FA (kW)	0.63	0.87
Max. Decay Heat / Zone (kW)	10.08	13.92
Max. Decay Heat / DSC (kW)	24.0	

Notes:

(1) Up to 28 damaged FAs may be stored in Zone 1 and Zone 2 only.

Figure 1-2
Heat Load Zoning Configuration 1 for the NUHOMS®-32PT DSC



* Denotes locations where intact or damaged FAs may be stored.

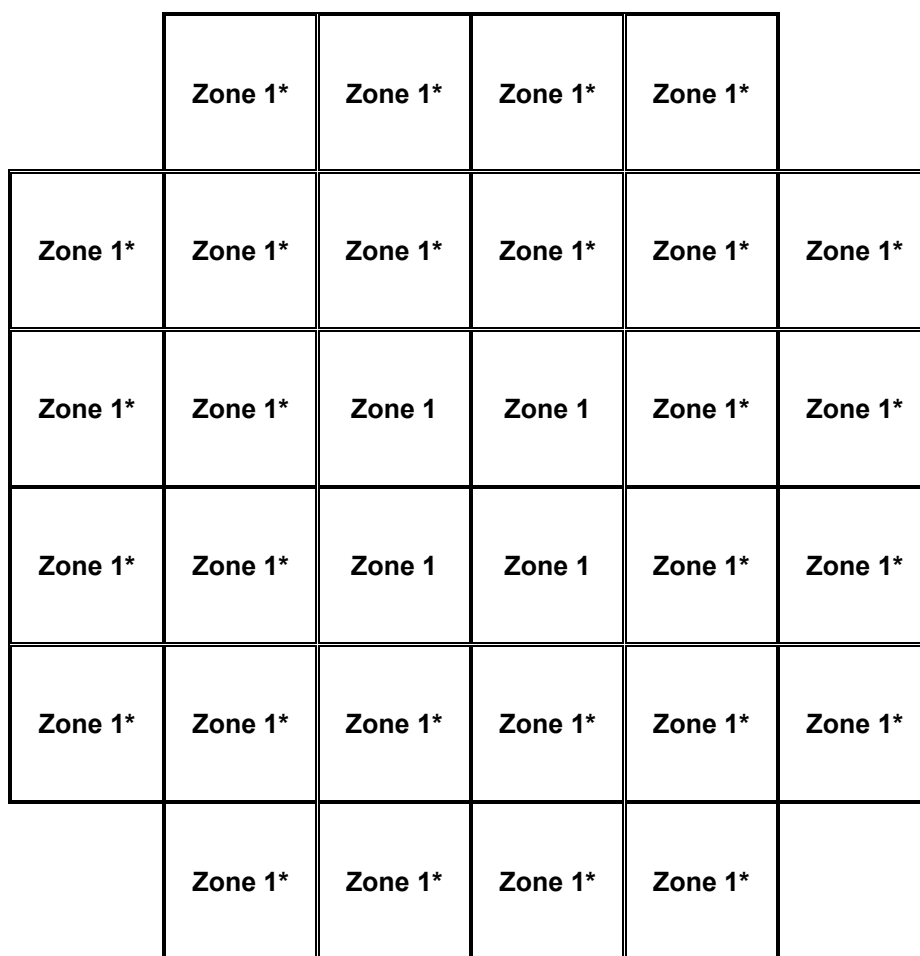
** Denotes locations where intact or damaged FAs or FFCs may be stored.

	Zone 1	Zone 2
Max. Decay Heat / FA (kW)	0.6	1.2
Max. Decay Heat / Zone (kW)	14.4	9.6
Max. Decay Heat / DSC (kW)	24.0	

Notes:

- (1) The maximum allowable heat load per FFC is 0.8 kW.
- (2) Up to 28 damaged FAs may be stored in Zone 1 and Zone 2 only. When storing damaged FAs in Zone 1, intact FAs or Failed Fuel Cans (FFCs) may be stored in the remaining Zone 1 and Zone 2 locations.
- (3) Up to 8 FFCs may be stored in Zone 2 only. When storing FFCs in Zone 2, intact or damaged FAs may be stored in the remaining Zone 1 and Zone 2 locations.

Figure 1-3
Heat Load Zoning Configuration 2 for the NUHOMS®-32PT DSC



* Denotes locations where intact or damaged FAs may be stored.

	Zone 1
Max. Decay Heat / FA (kW)	0.7
Max. Decay Heat / Zone (kW)	22.4
Max. Decay Heat / DSC (kW)	22.4

Notes:

(1) Up to 28 damaged FAs may be stored in Zone 1 only.

Figure 1-4
Heat Load Zoning Configuration 3 for the NUHOMS®-32PT DSC

		Zone 3*	Zone 2*	Zone 2*	Zone 3*	
	Zone 3*	Zone 2*	Zone 2*	Zone 2*	Zone 2*	Zone 3*
	Zone 2*	Zone 2*	Zone 1	Zone 1	Zone 2*	Zone 2*
	Zone 2*	Zone 2*	Zone 1	Zone 1	Zone 2*	Zone 2*
	Zone 4*	Zone 2*	Zone 2*	Zone 2*	Zone 2*	Zone 4*
		Zone 4*	Zone 2*	Zone 2*	Zone 4*	

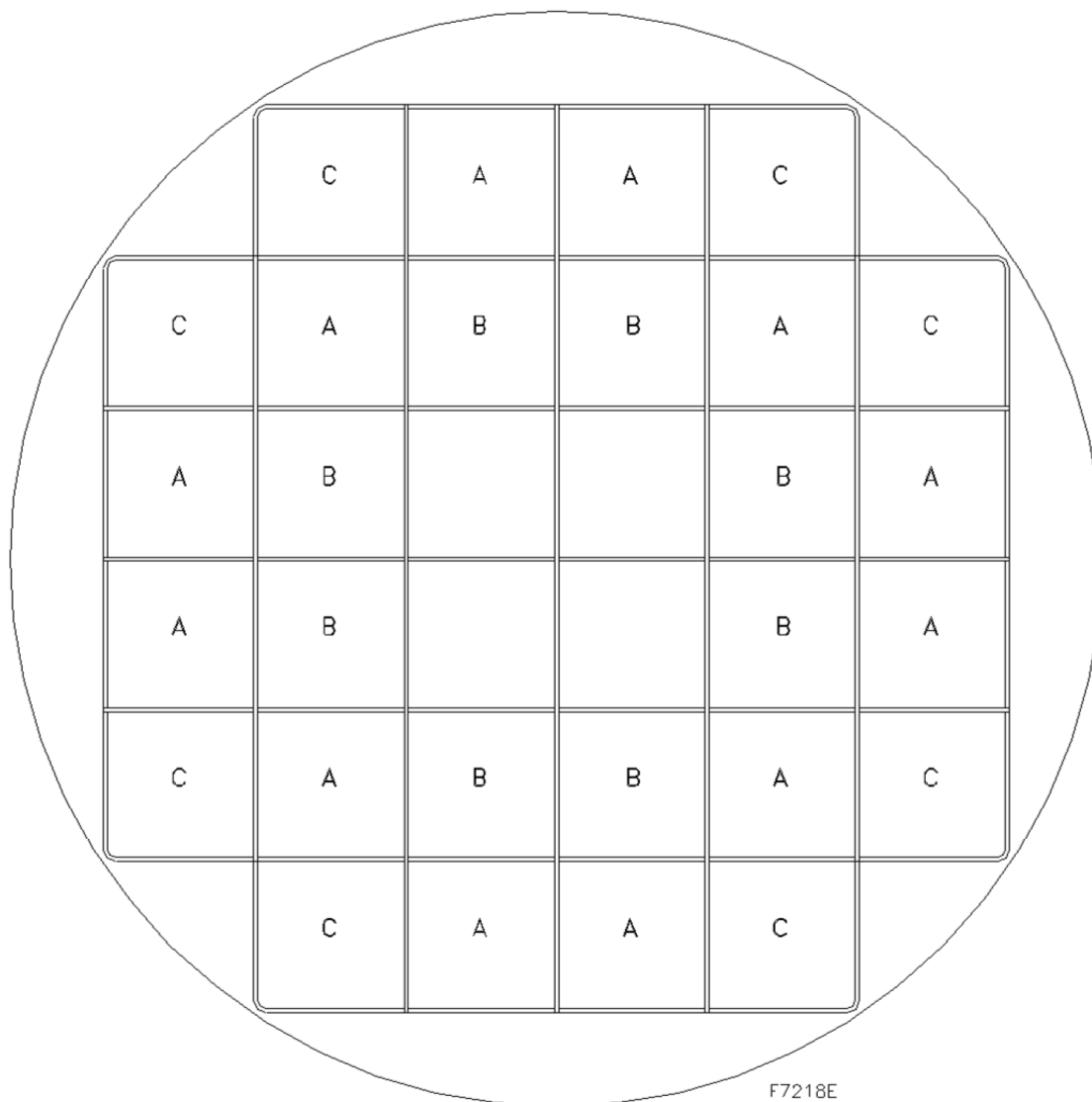
* Denotes where damaged FAs may be stored.

	Zone 1	Zone 2	Zone 3	Zone 4
Max. Decay Heat / FA (kW)	0.40	0.60	2.20 ⁽²⁾	1.70 ⁽²⁾
Max. Decay Heat / DSC (kW)	24 ⁽¹⁾			

Notes:

- (1) Adjust payload to maintain the total DSC heat load within the specified limit.
- (2) If damaged FAs are loaded in any Zone 2, Zone 3 or Zone 4 locations, the maximum allowable decay heat per FA in Zone 3 and 4 is 1.2 kW.
- (3) Up to 28 damaged FAs may be stored in Zones 2, 3 and 4 only.

Figure 1-4a
Heat Load Zoning Configuration 4 for the NUHOMS® -32PT DSC



Notes:

- (1) The "C" locations shall be employed when loading up to 8 FFCs as specified in Table 1-1g3
- (2) The "B" locations and "C" locations shall be employed when loading up to 16 damaged fuel assemblies as specified in Table 1-1g2
- (3) The "A" locations, "B" locations and "C" locations shall be employed when loading greater than 16 and up to 28 damaged fuel assemblies as specified in Table 1-1g2

Figure 1-4b
Location of Damaged and Failed Fuel Assemblies inside 32PT DSC

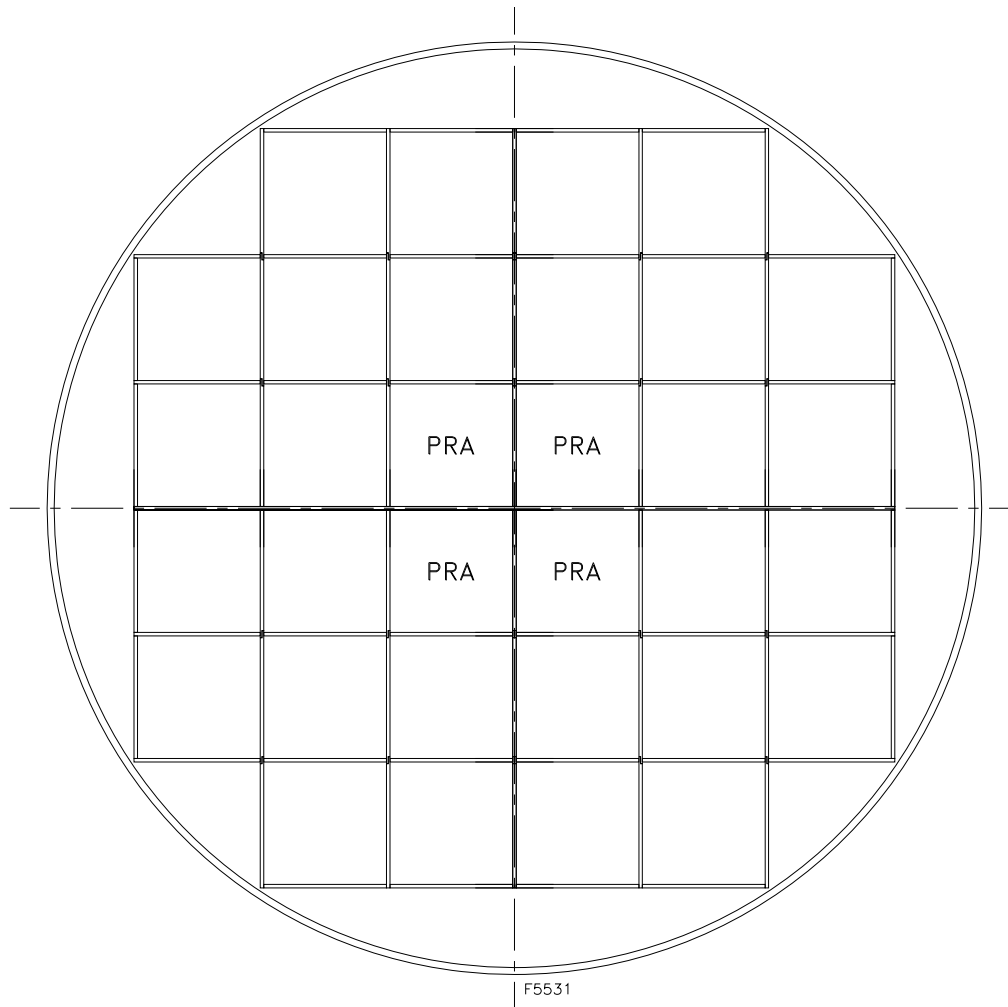
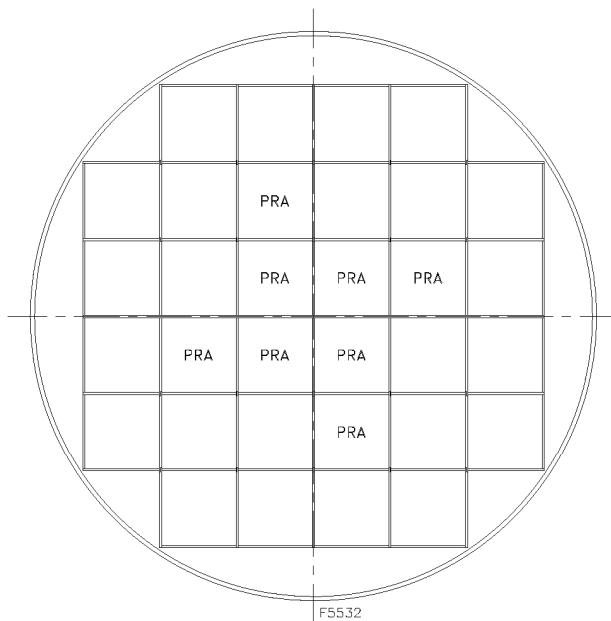


Figure 1-5
Required PRA Locations for the NUHOMS®-32PT DSC Configuration with Four PRAs



Or

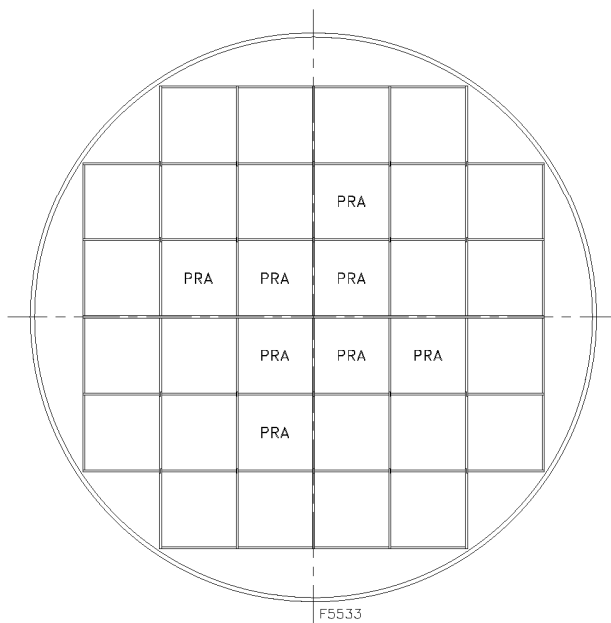


Figure 1-6
Required PRA Locations for the NUHOMS®-32PT DSC Configuration with Eight PRAs

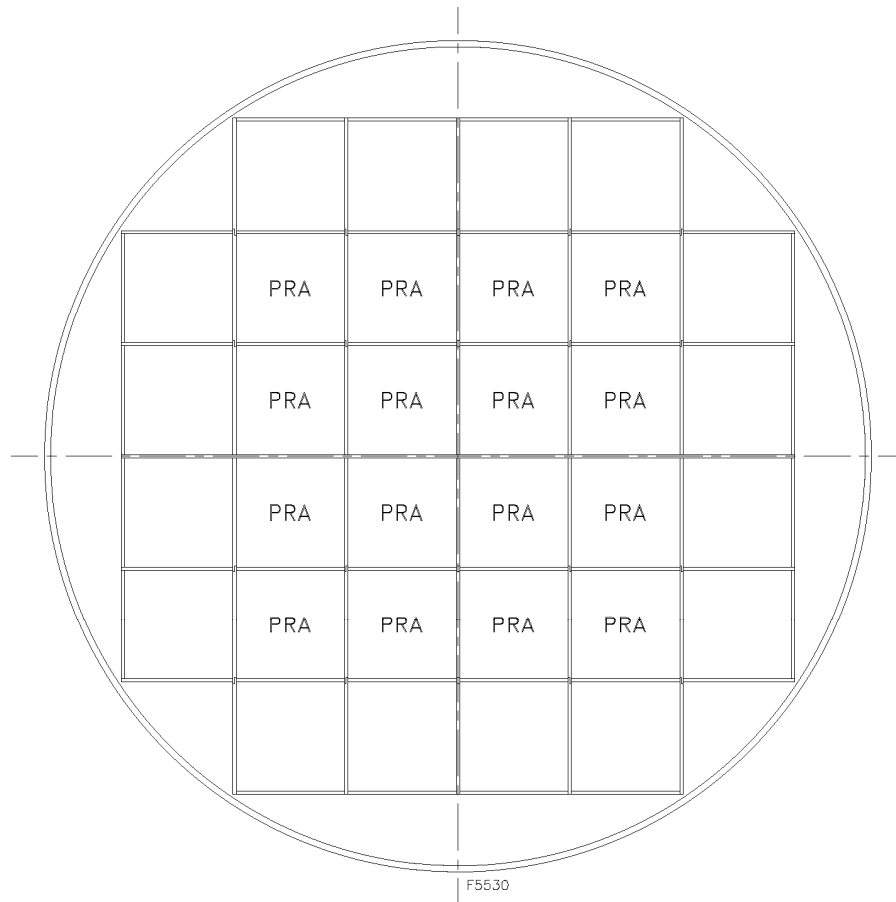
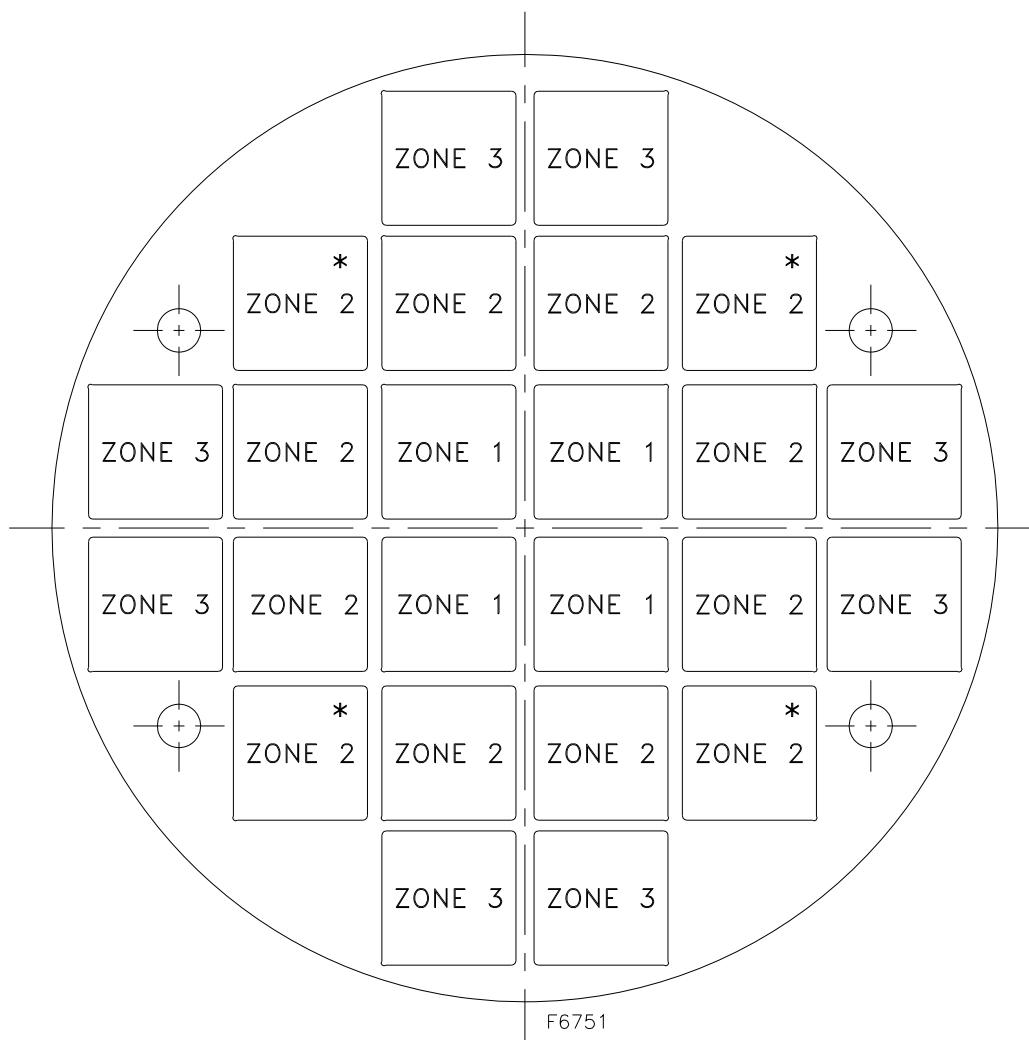


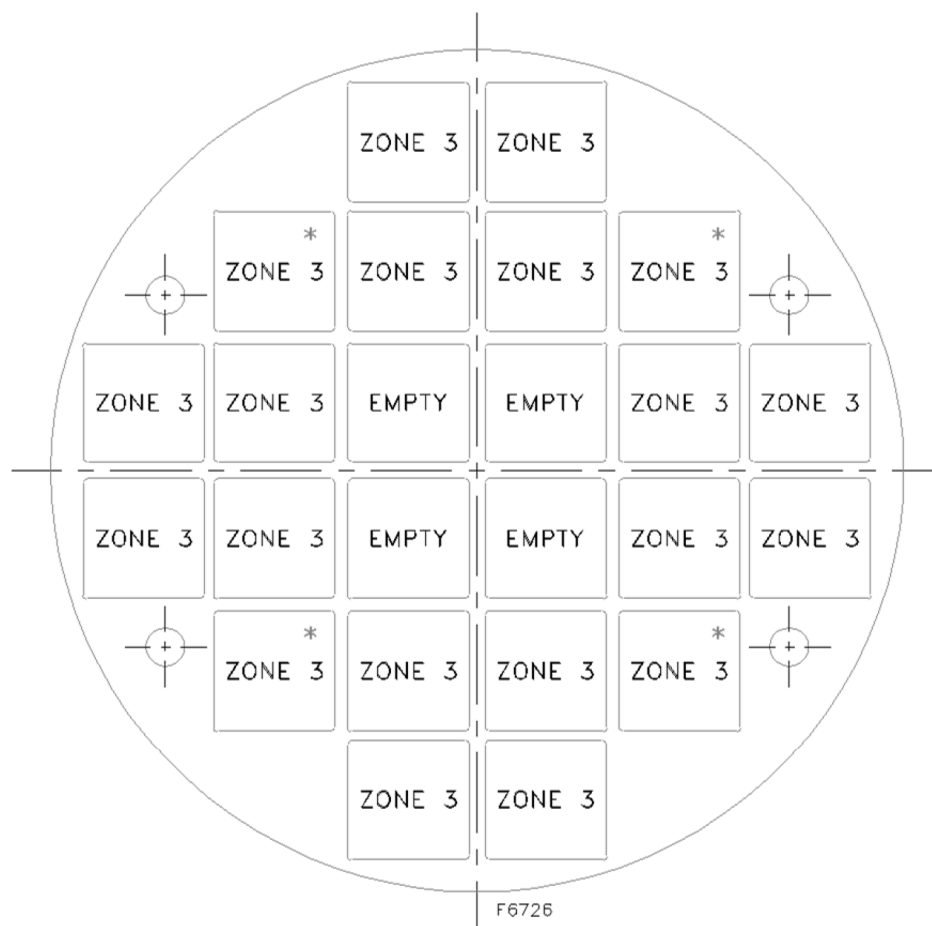
Figure 1-7
Required PRA Locations for the NUHOMS®-32PT DSC Configuration with Sixteen PRAs



* DENOTES LOCATION WHERE INTACT OR DAMAGED FUEL ASSEMBLY CAN BE STORED.

	Zone 1	Zone 2	Zone 3
Maximum Decay Heat (kW/FA)	0.7	1	1.3
Maximum Decay Heat per Zone (kW)	2.8	10.8	10.4

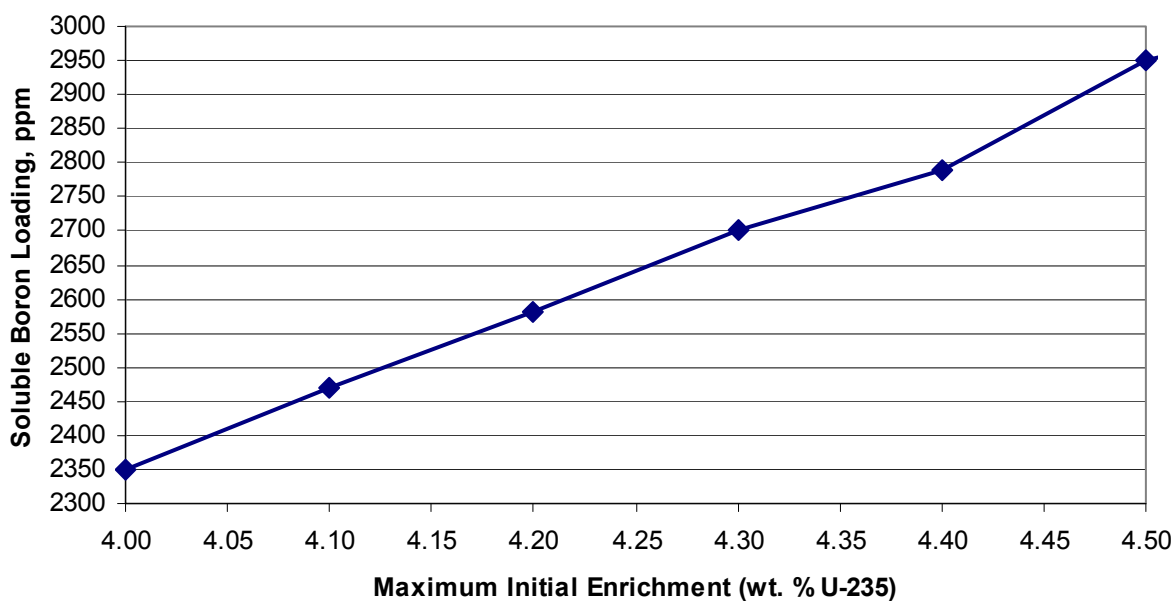
Figure 1-8
Heat Load Zoning Configuration for Fuel Assemblies (with or without Control Components) Stored in NUHOMS®-24PHB DSC-Configuration 1



* DENOTES LOCATION WHERE INTACT OR DAMAGED FUEL ASSEMBLY CAN BE STORED.

	Zone 1	Zone 2	Zone 3
Maximum Decay Heat (kW/FA)	N/A	N/A	1.3
Maximum Decay Heat per Zone (kW)	N/A	N/A	24.0

Figure 1-9
Heat Load Zoning Configuration for Fuel Assemblies (with or without Control Components) Stored in NUHOMS®-24PHB DSC-Configuration 2

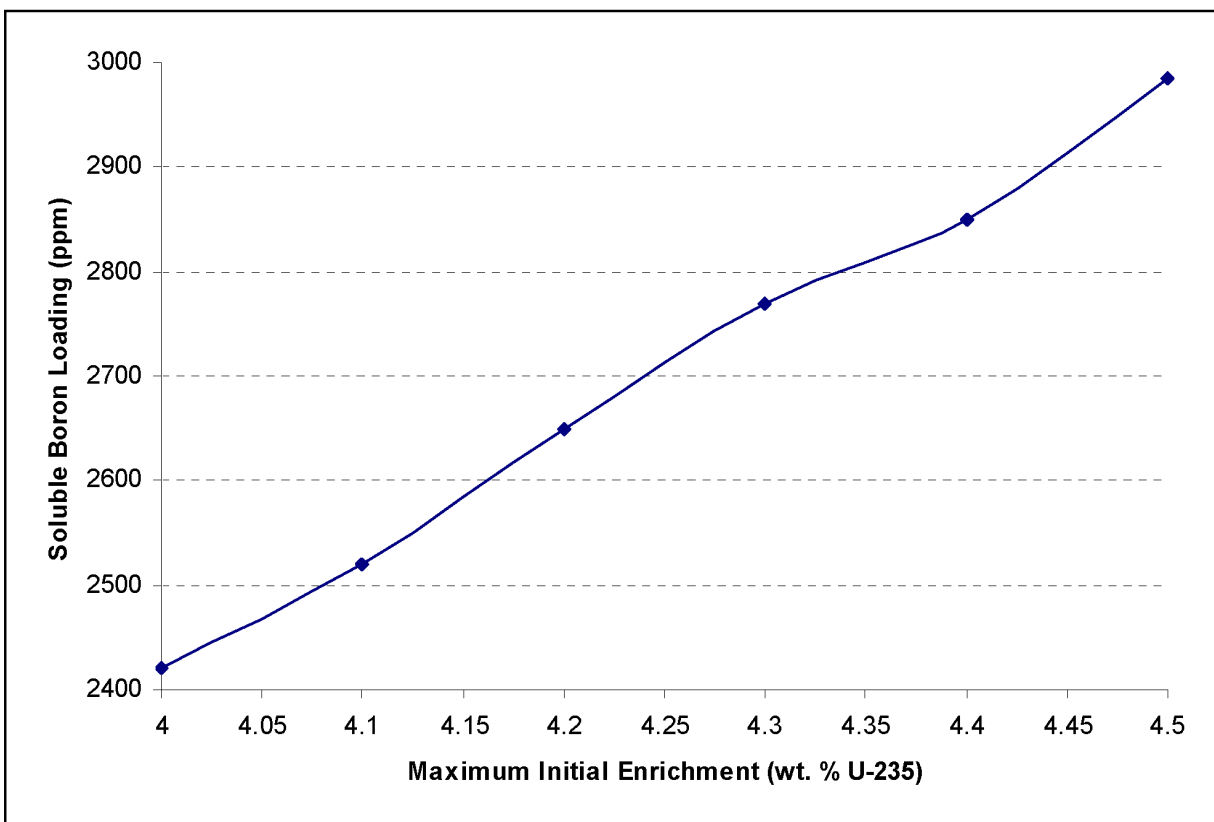


Linear Interpolation allowed between points.

Initial Enrichment	Boron Loading, ppm (when only intact assemblies are loaded)
≤ 4.0	2350
4.1	2470
4.2	2580
4.3	2700
4.4	2790
4.5	2950

Note: The maximum planar average initial enrichment is specified as “initial enrichment.”

Figure 1-10
Soluble Boron Concentration vs. Fuel Initial U-235 Enrichment (Intact Fuel)
for the NUHOMS® 24PHB System

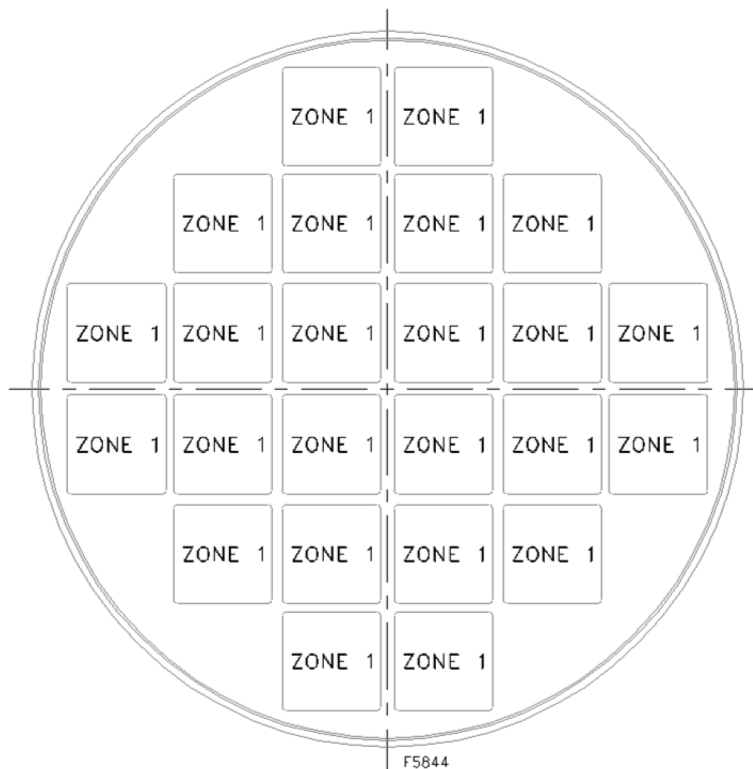


Linear interpolation allowed between points.

Initial Enrichment	Boron Loading, ppm (whenever damaged assemblies are loaded)
≤4.0	2420
4.1	2520
4.2	2650
4.3	2770
4.4	2850
4.5	2985

Note: The maximum planar average initial enrichment is specified as "Initial Enrichment."

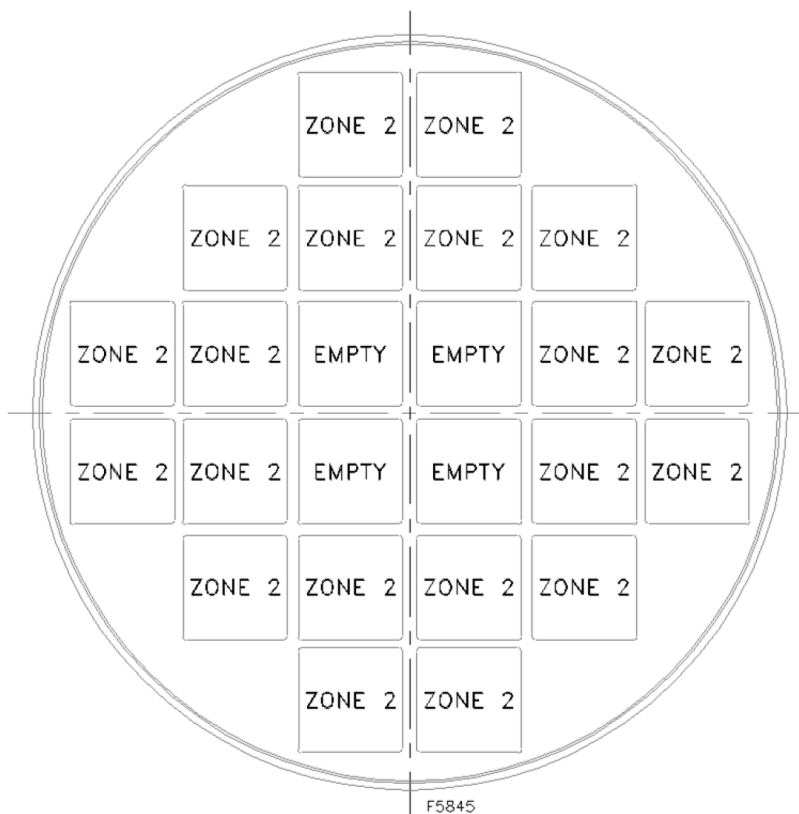
Figure 1-10a
Soluble Boron Concentration vs. Fuel Initial U-235 Enrichment
(Damaged Fuel) for the NUHOMS®-24PHB System



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	1.7 ⁽¹⁾	N/A	N/A	N/A
Maximum Decay Heat per Zone (kW)	40.8	N/A	N/A	N/A

⁽¹⁾ The maximum decay heat load allowed for failed fuel assemblies is 1.0 kW/FA.

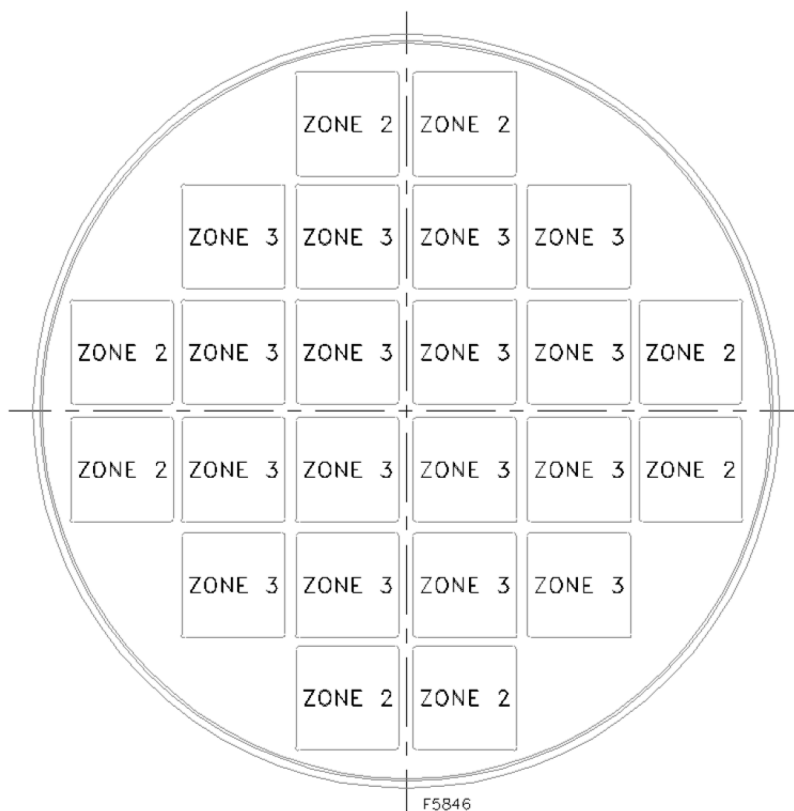
Figure 1-11
Heat Load Zoning Configuration Number 1 for 24PTH-S and 24PTH-L DSCs



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	N/A	2 ⁽¹⁾	N/A	N/A
Maximum Decay Heat per Zone (kW)	N/A	40	N/A	N/A

⁽¹⁾ The maximum decay heat load allowed for failed fuel assemblies is 1.0 kW/FA.

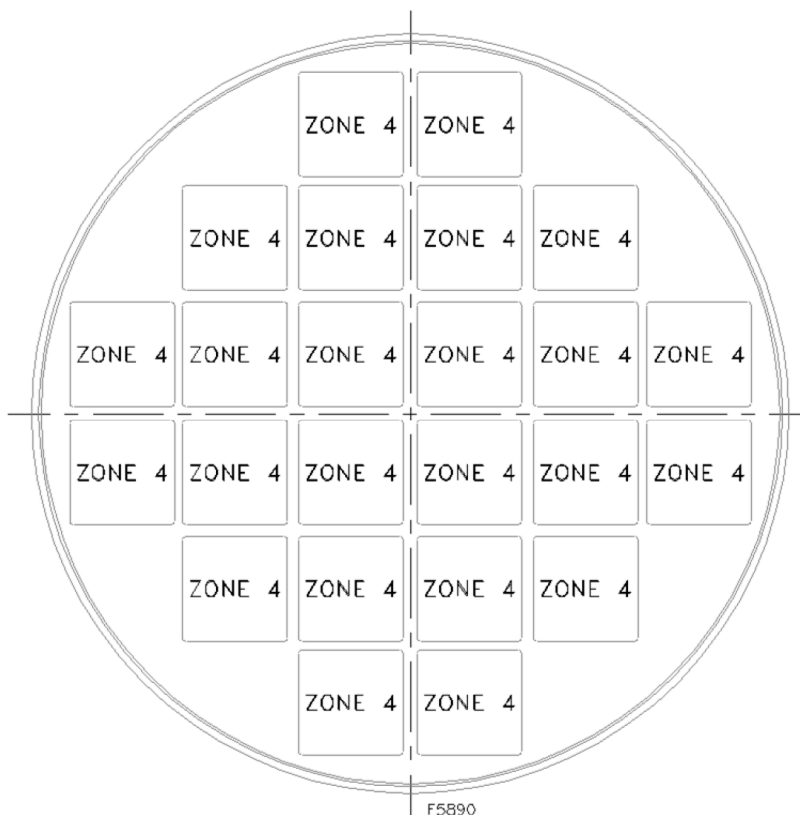
Figure 1-12
Heat Load Zoning Configuration Number 2 for 24PTH-S and 24PTH-L DSCs



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	N/A	2 ⁽¹⁾	1.5	N/A
Maximum Decay Heat per Zone (kW)	N/A	16	24	N/A

⁽¹⁾ The maximum decay heat load allowed for failed fuel assemblies is 1.0 kW/FA.

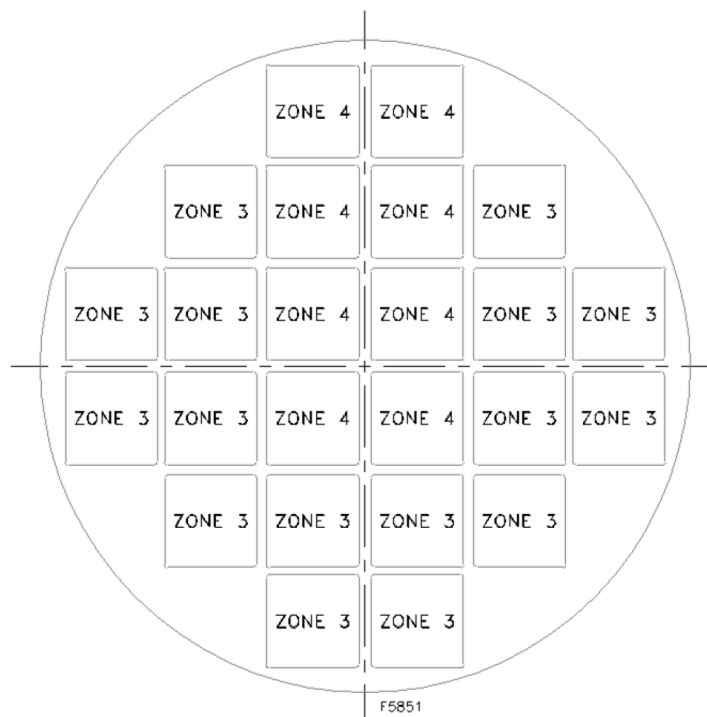
Figure 1-13
Heat Load Zoning Configuration Number 3 for 24PTH-S and 24PTH-L DSCs



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	N/A	N/A	N/A	1.3 ⁽¹⁾
Maximum Decay Heat per Zone (kW)	N/A	N/A	N/A	31.2

⁽¹⁾ The maximum decay heat load allowed for failed fuel assemblies is 0.6 kW/FA.

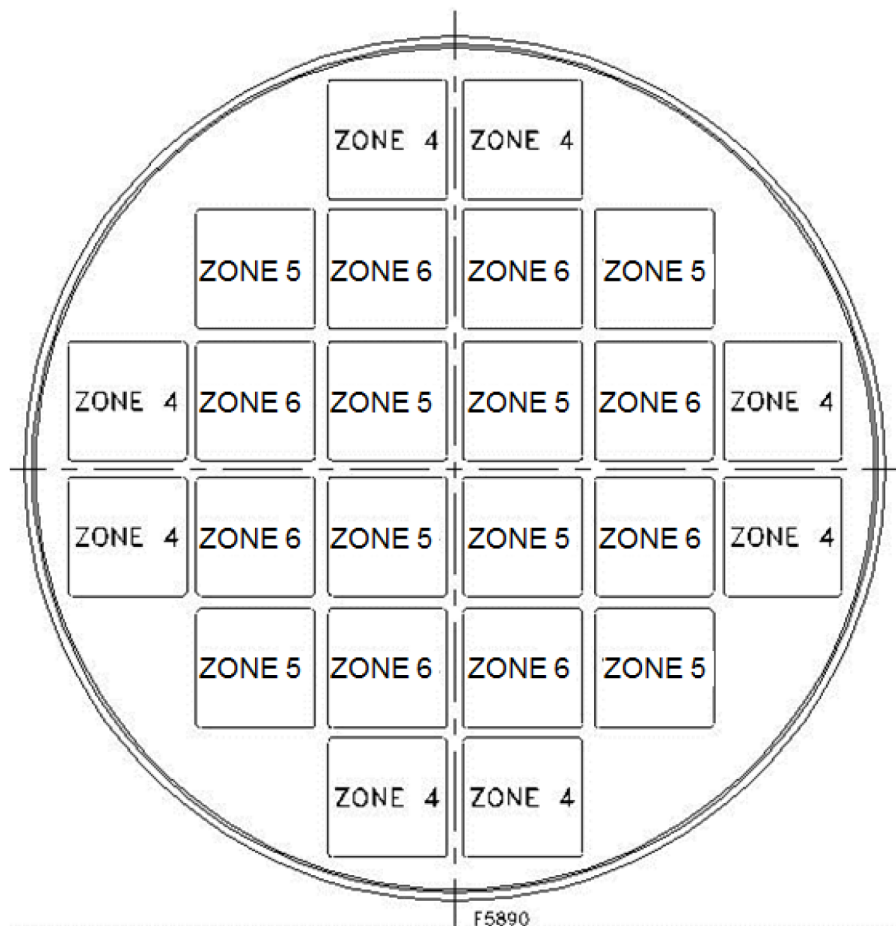
Figure 1-14
Heat Load Zoning Configuration Number 4 for 24PTH-S and 24PTH-L DSCs



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	N/A	N/A	1.5 ⁽³⁾	1.3 ⁽³⁾
Maximum Decay Heat per Zone (kW)	N/A	N/A	Note 1	10.4

- (1) Fuel assemblies with a maximum heat load of 1.5 kW are permitted in Zone 3 as long as the total of 24 kW/canister maximum heat load is maintained.
- (2) This configuration is applicable to Basket Types 2A, 2B, or 2C only.
- (3) The maximum decay heat load allowed for failed fuel assemblies is 0.6 kW/FA. If damaged fuel assemblies are loaded with the failed fuel assemblies in the same basket, the maximum decay heat load allowed for damaged fuel assemblies is also 0.6 kW/FA.

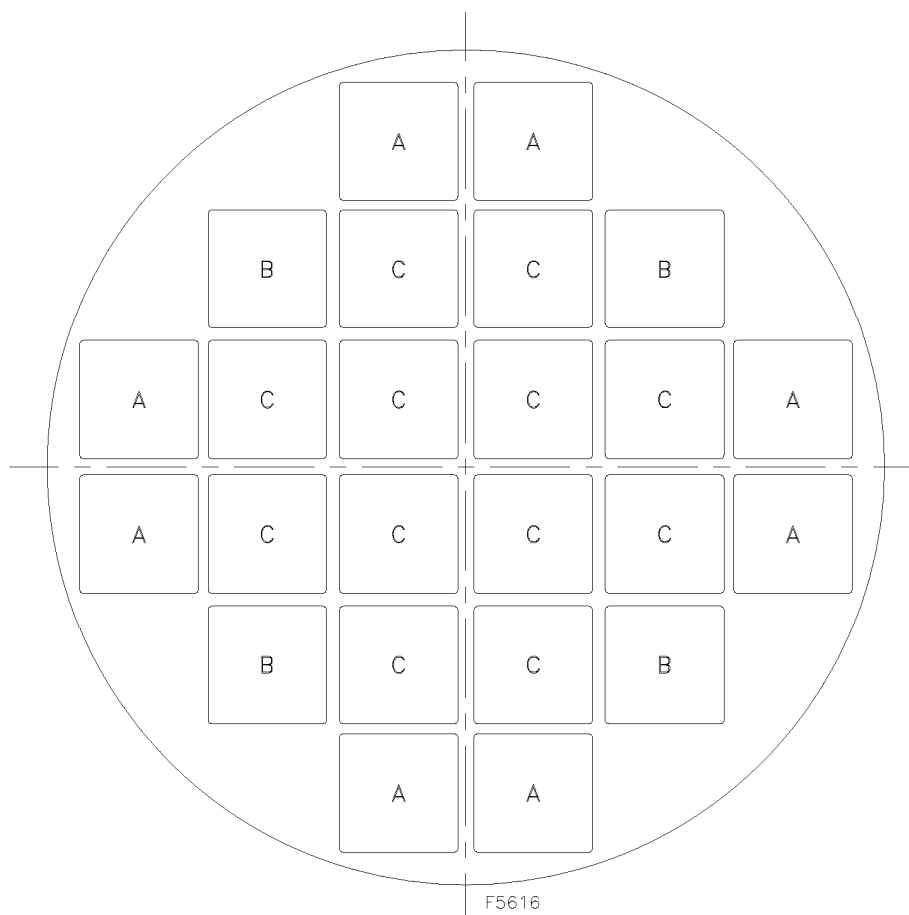
Figure 1-15
Heat Load Zoning Configuration Number 5 for 24PTH-S-LC⁽²⁾



	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	1.3	0.6	2.5
Maximum Decay Heat per Zone (kW)	10.4	4.8	20.0

(1) Only intact fuel assemblies are allowed for this HLZC.

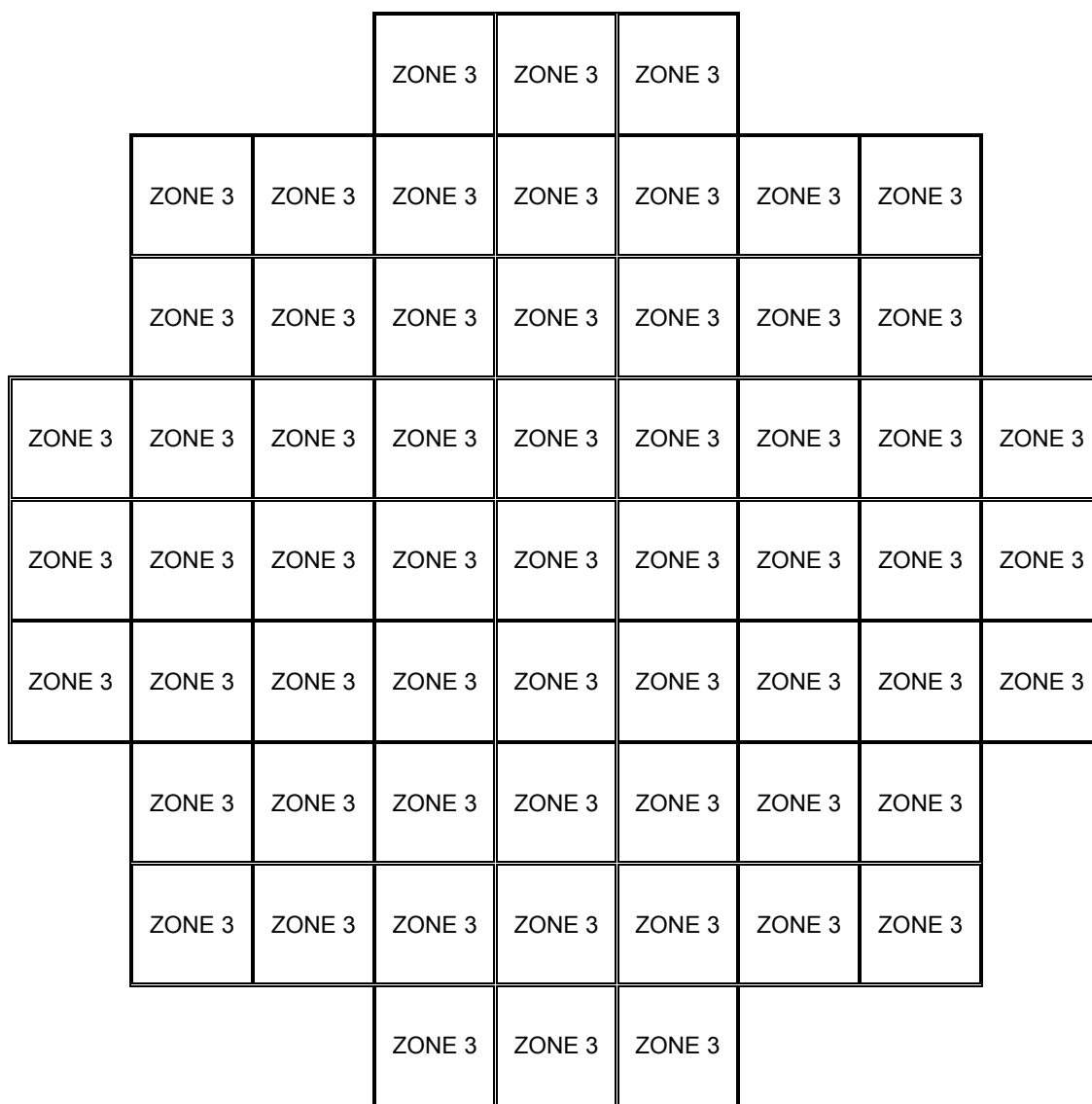
Figure 1-15a
Heat Load Zoning Configuration No. 6 for 24PTH-S and 24PTH-L DSCs with Type 1 Basket



Notes:

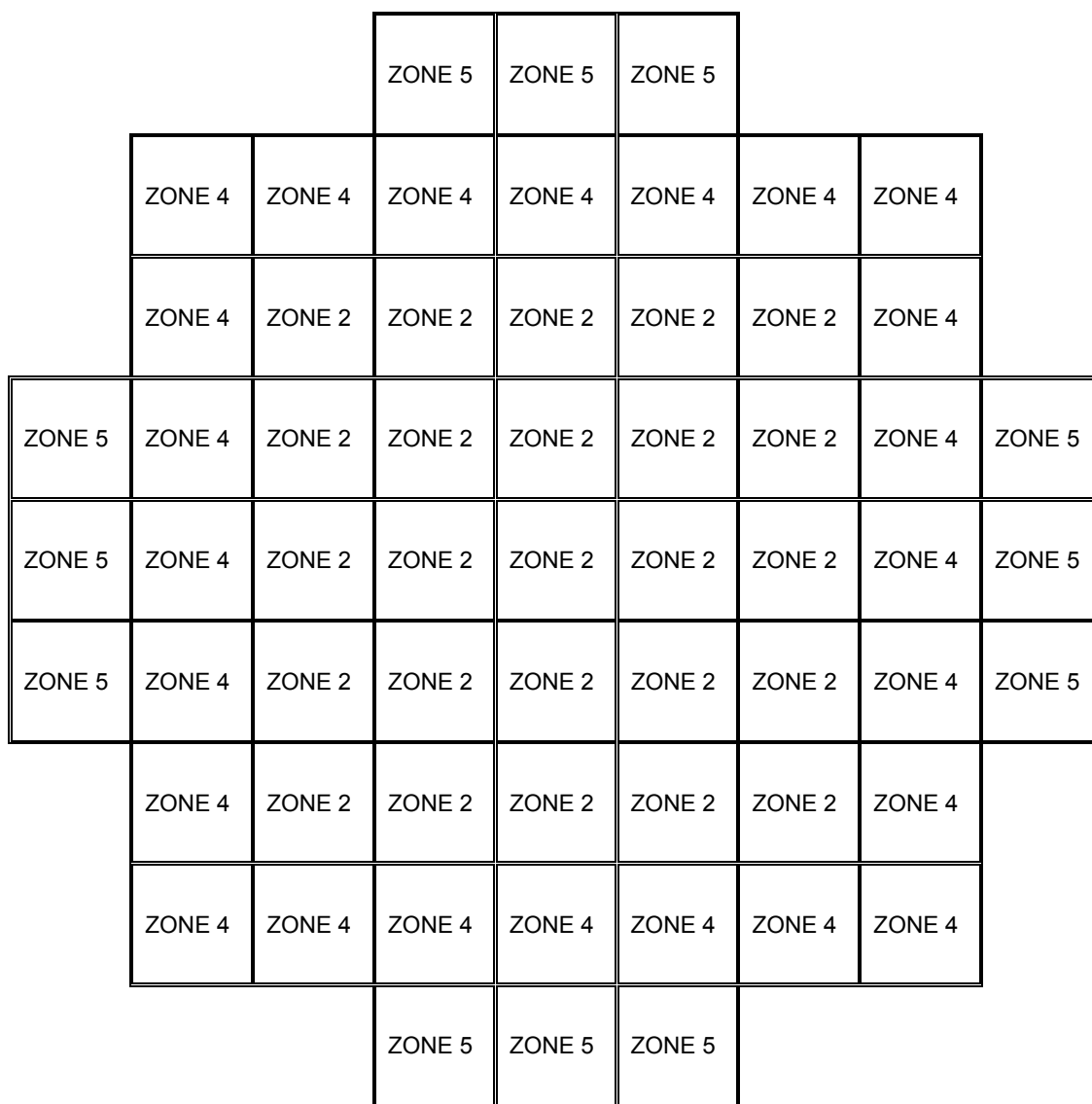
1. Locations identified as "A" are for placement of up to 8 damaged or failed fuel assemblies (balance intact).
2. Locations identified as "B" are for placement of up to 4 additional damaged fuel assemblies (Maximum of 12 damaged fuel assemblies allowed, Locations "A" and "B" combined, balance intact).
3. Locations identified as "C" are for placement of up to 12 intact fuel assemblies, including 4 empty slots in the center as shown in Figure 1-12.

Figure 1-16
Location of Failed or Damaged Fuel Inside 24PTH DSC⁽¹⁾⁽²⁾⁽³⁾



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	NA	NA	0.393	NA	NA	NA
Maximum Decay Heat per Zone (kW)	NA	NA	22.0	NA	NA	NA
Maximum Decay Heat per DSC (kW)	22.0					

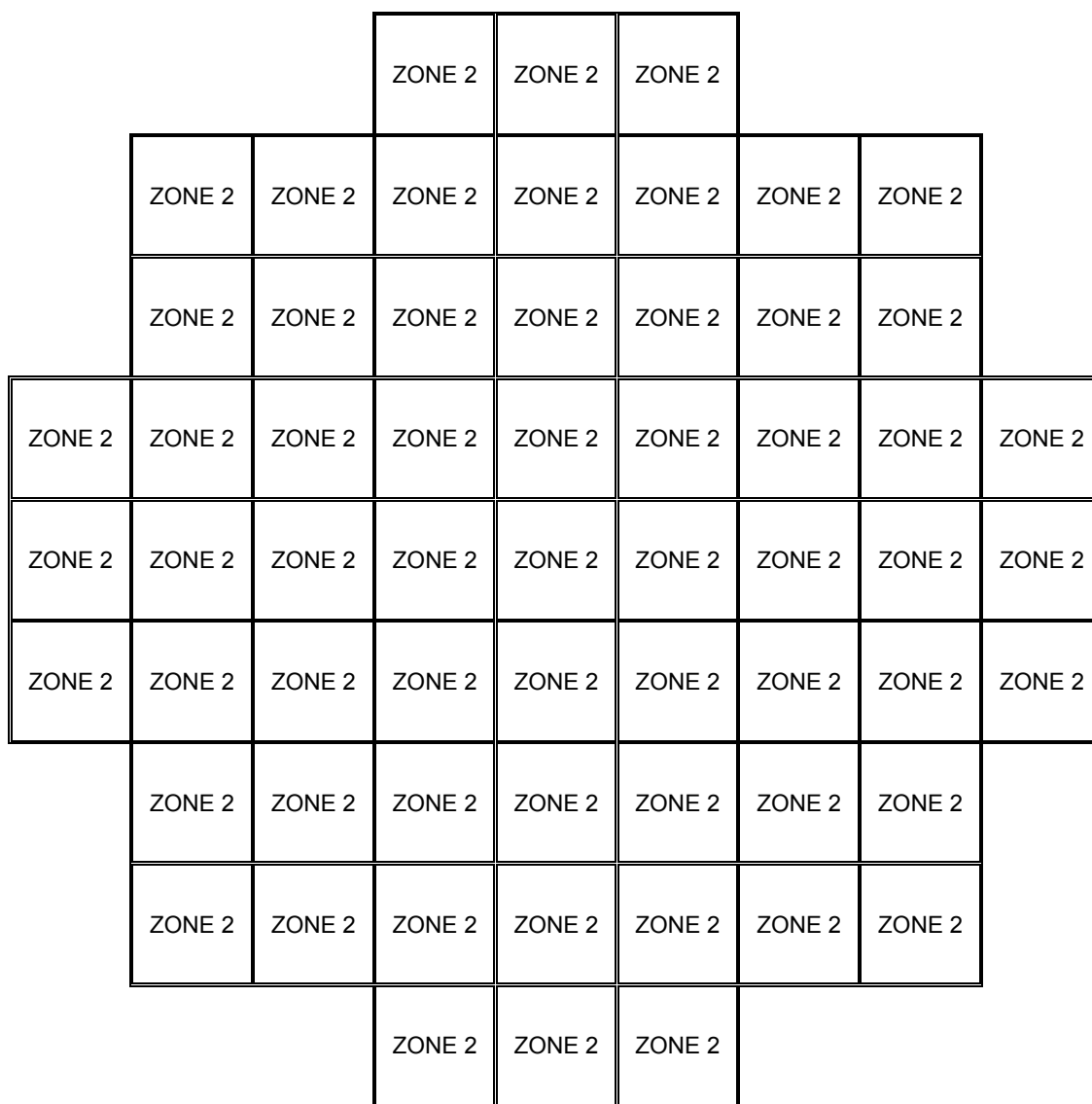
Figure 1-17
Heat Load Zoning Configuration Number 1 for Type 1 or Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	NA	0.35	NA	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	8.75	NA	11.52	6.48	NA
Maximum Decay Heat per DSC (kW)	22.0 ⁽¹⁾					

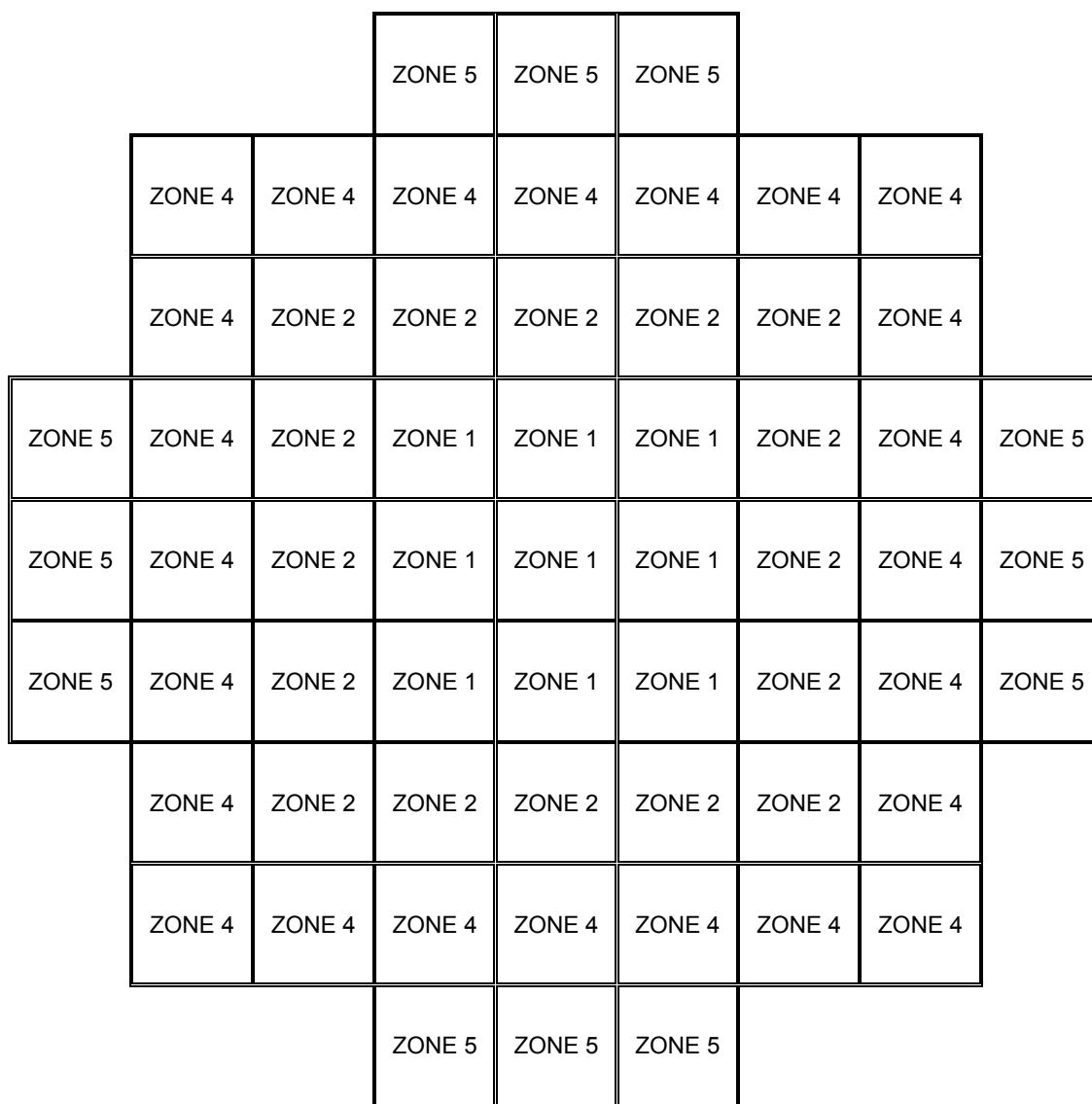
⁽¹⁾ Adjust payload to maintain total DSC heat load within the specified limit

Figure 1-18
Heat Load Zoning Configuration Number 2 for Type 1 or Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	NA	0.35	NA	NA	NA	NA
Maximum Decay Heat per Zone (kW)	NA	19.4	NA	NA	NA	NA
Maximum Decay Heat per DSC (kW)	19.4					

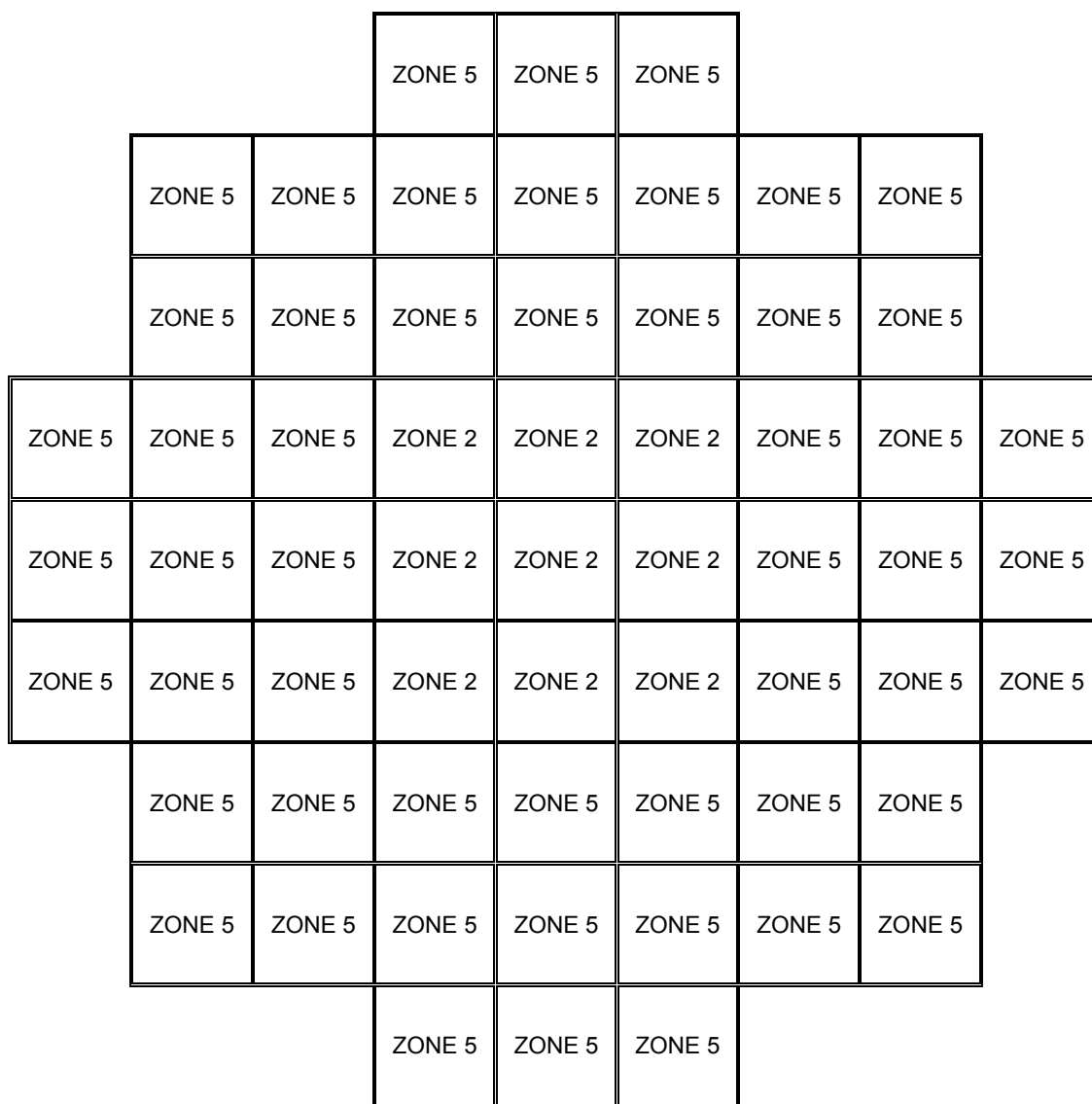
Figure 1-19
Heat Load Zoning Configuration Number 3 for Type 1 or Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	0.22	0.35	NA	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	1.98	5.60	NA	11.52	6.48	NA
Maximum Decay Heat per DSC (kW)	19.4 ⁽¹⁾					

⁽¹⁾ Adjust payload to maintain total DSC heat load within the specified limit.

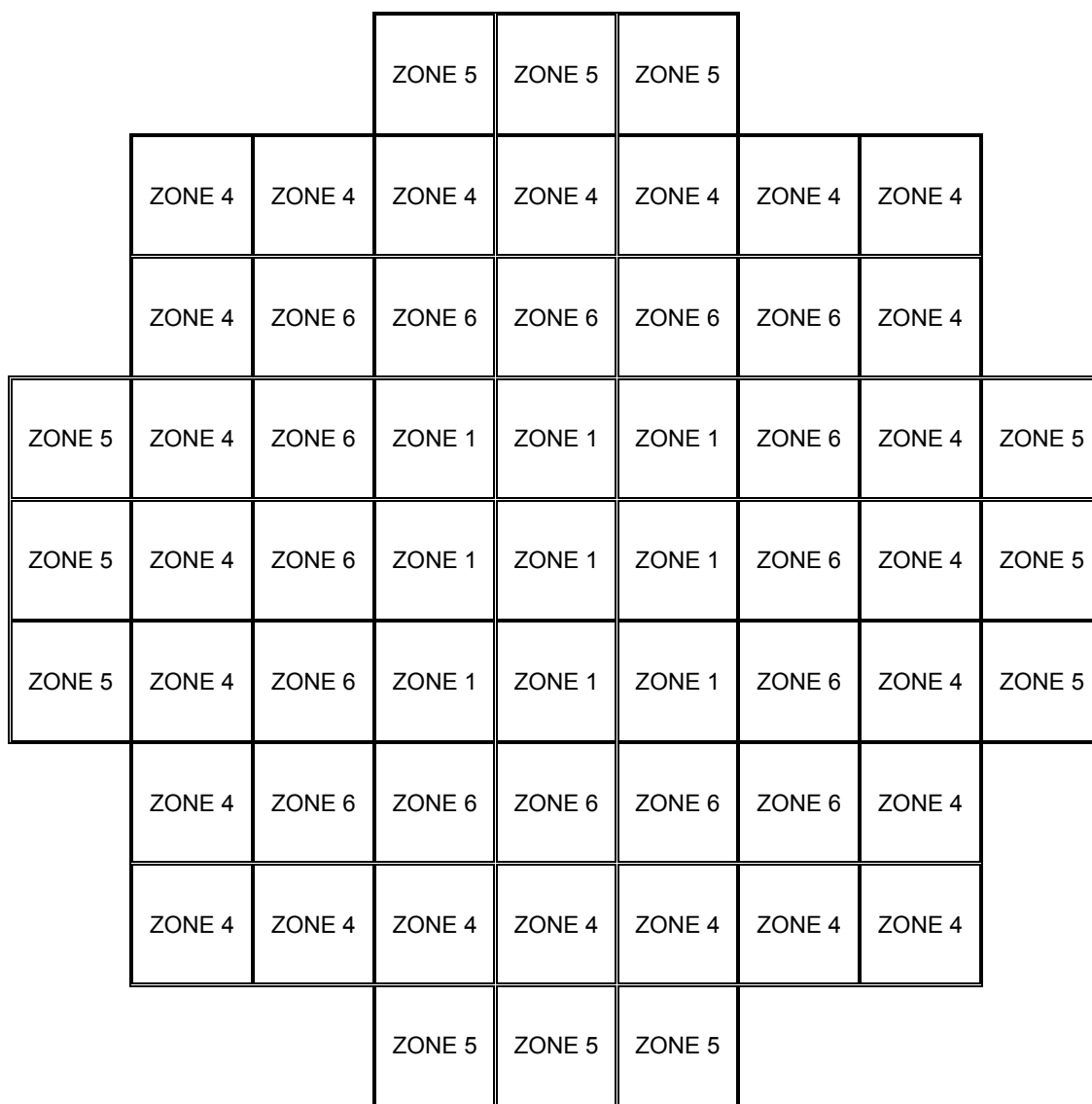
Figure 1-20
Heat Load Zoning Configuration Number 4 for Type 1 or Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	NA	0.35	NA	NA	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	3.15	NA	NA	28.08	NA
Maximum Decay Heat per DSC (kW)	31.2 ⁽¹⁾					

⁽¹⁾ Adjust payload to maintain total DSC heat load within the specified limit.

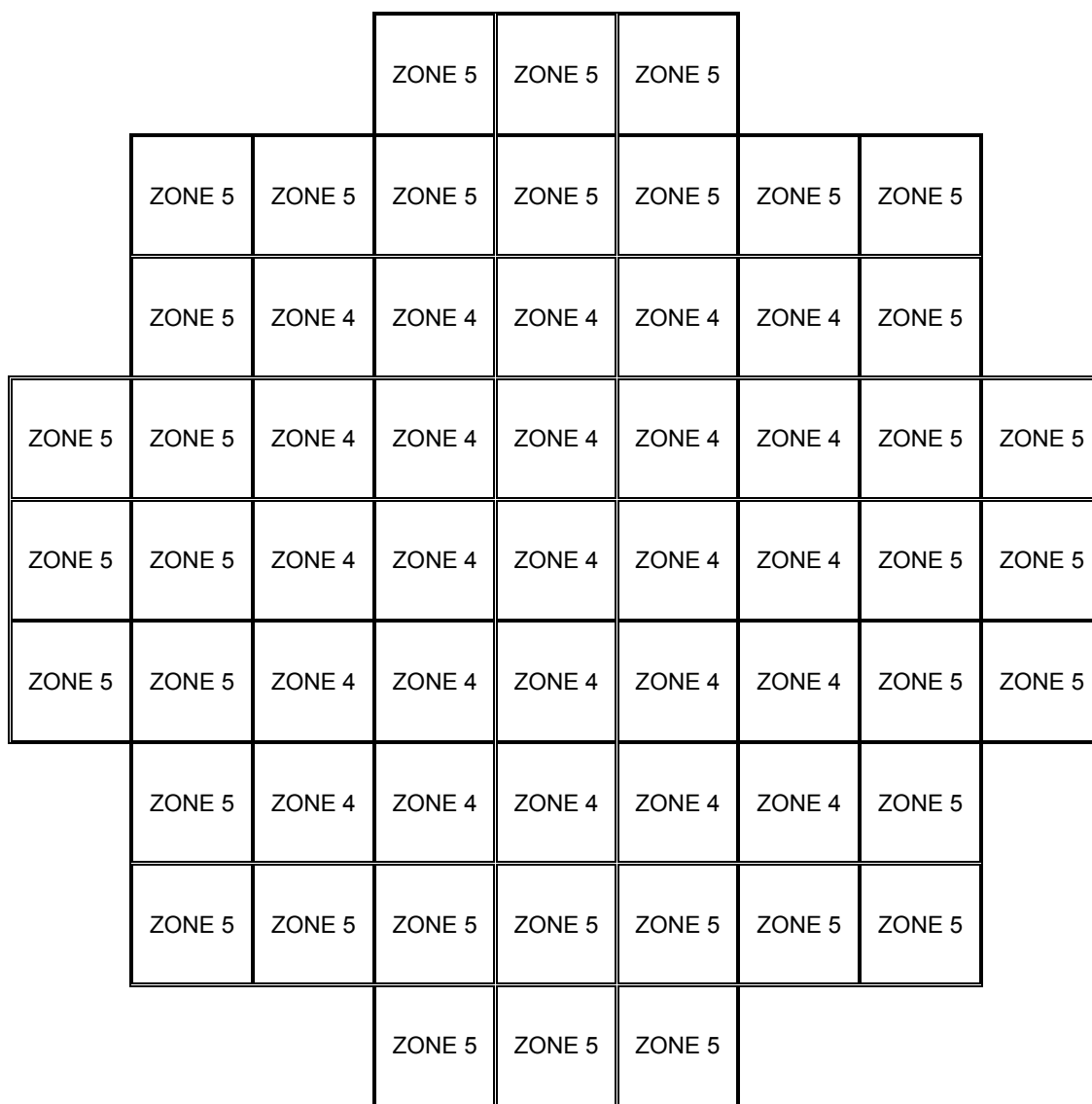
Figure 1-21
Heat Load Zoning Configuration Number 5 for Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	0.22	NA	NA	0.48	0.54	0.70
Maximum Decay Heat per Zone (kW)	1.98	NA	NA	11.52	6.48	11.20
Maximum Decay Heat per DSC (kW)	31.2 ⁽¹⁾					

⁽¹⁾ Adjust payload to maintain total DSC heat load within the specified limit.

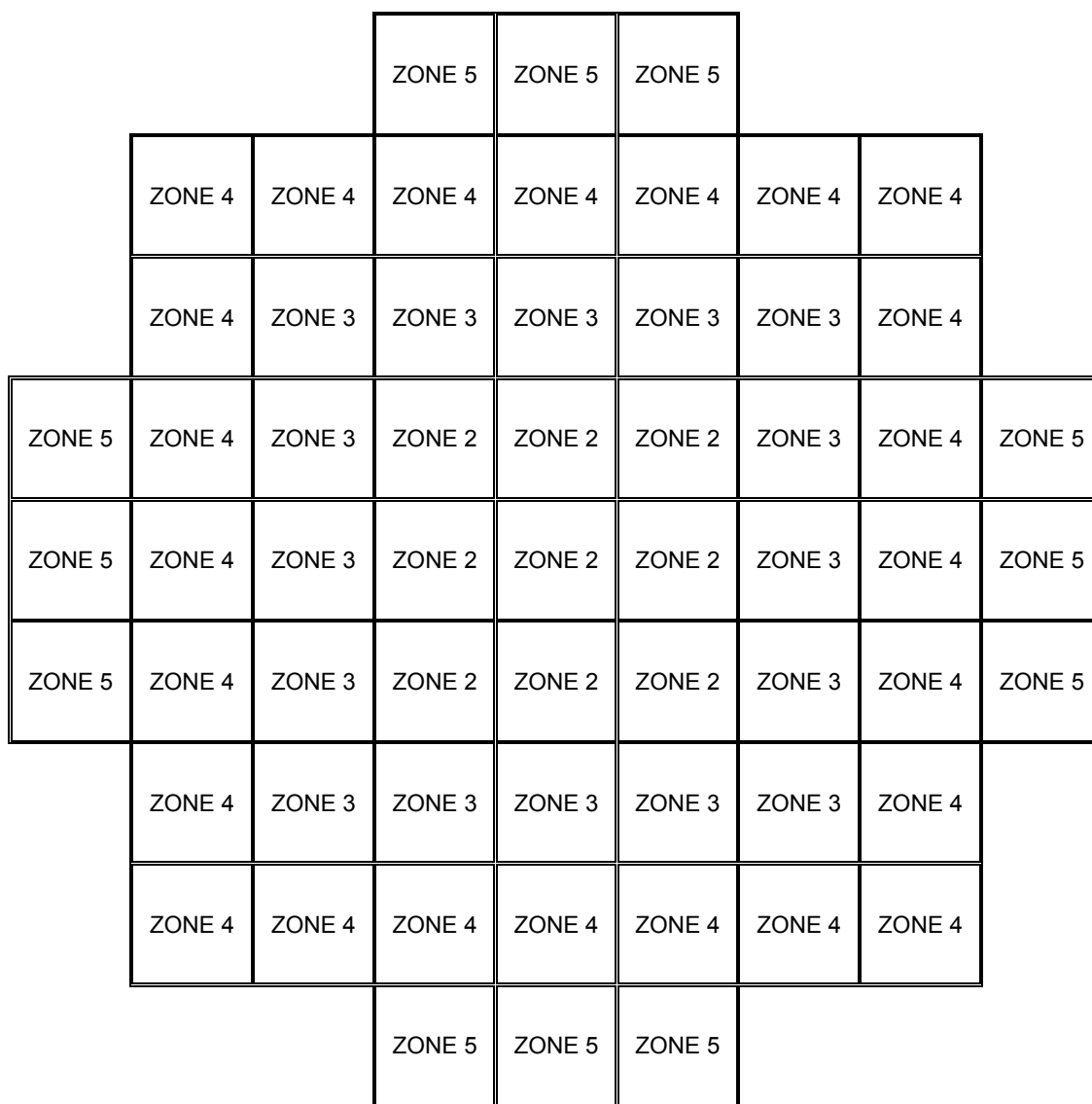
Figure 1-22
Heat Load Zoning Configuration Number 6 for Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	NA	NA	NA	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	NA	NA	12.00	19.44	NA
Maximum Decay Heat per DSC (kW)	31.2 ⁽¹⁾					

⁽¹⁾ Adjust payload to maintain total DSC heat load within the specified limit.

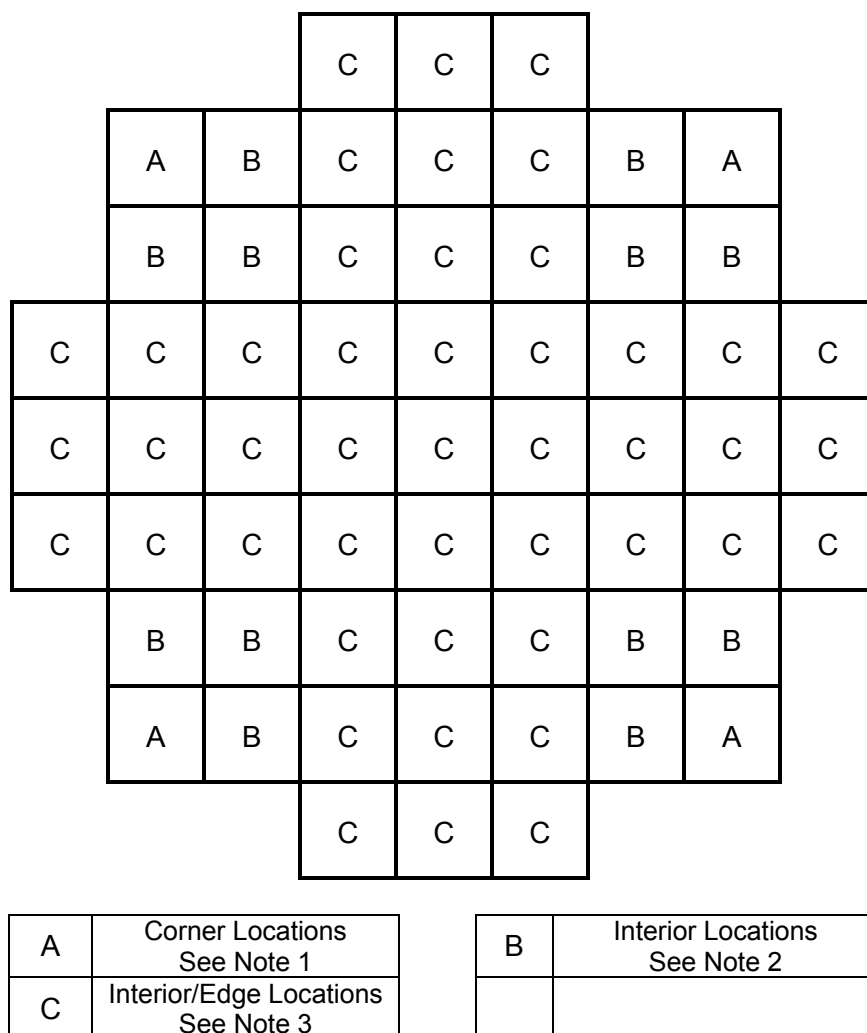
Figure 1-23
Heat Load Zoning Configuration Number 7 for Type 2 61BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)	NA	0.35	0.393	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	3.15	6.288	11.52	6.48	NA
Maximum Decay Heat per DSC (kW)	27.4 ⁽¹⁾					

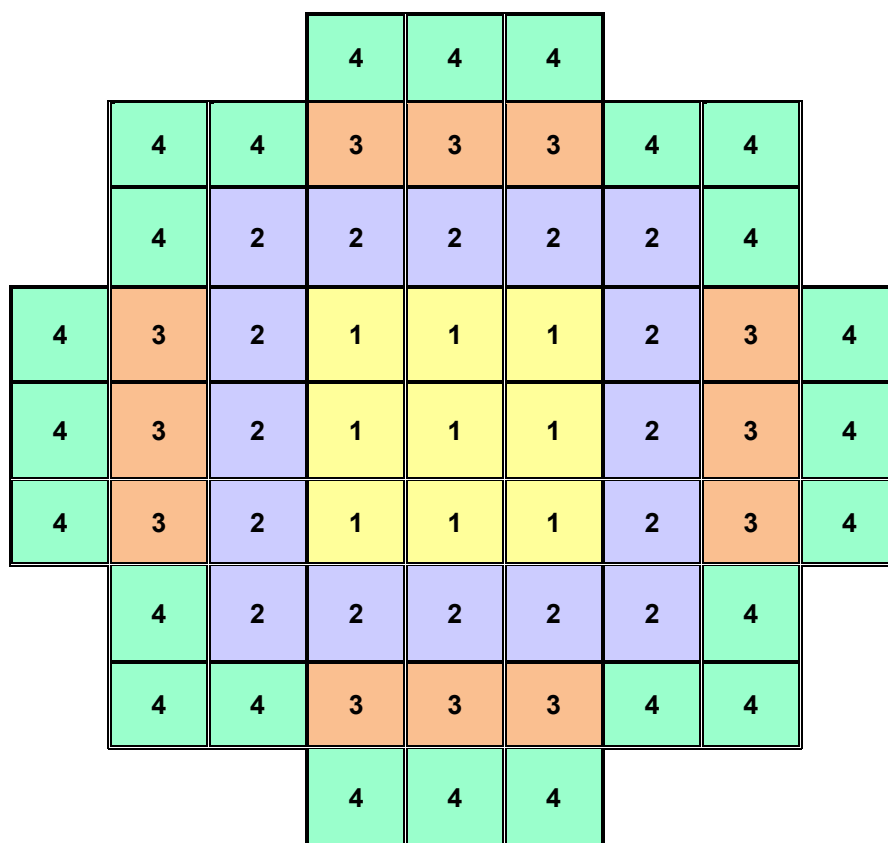
⁽¹⁾ Adjust payload to maintain total DSC heat load within the specified limit.

Figure 1-24
Heat Load Zoning Configuration Number 8 for Type 2 61BTH DSCs



- Note 1: When loading up to 4 damaged or 4 failed assemblies, these must be placed in corner "A" locations, and the remaining locations "B" and "C" shall be loaded with intact fuel. If fewer than 4 damaged or 4 failed assemblies are to be stored, the remaining "A" locations may be loaded with intact fuel provided they meet the respective damaged or failed enrichment limits of Table 1-1w1. Damaged and failed fuel shall not be mixed, i.e., up to four damaged assemblies may be stored, or up to four failed assemblies may be stored in "A" locations.
- Note 2: If loading more than four damaged assemblies, place first four damaged assemblies in the corner "A" locations per Note 1, and up to 12 additional damaged assemblies in these interior "B" locations, with the remaining intact in a 61BTH Basket. The maximum lattice average initial enrichment of assemblies (damaged or intact stored in the 2x2 cells) is limited to the "Five or More Damaged Assemblies" column of Table 1-1w. For the Type 2 DSC containing failed fuel assemblies, this enrichment is limited to the "and up to 12 Damaged Assemblies" column of Table 1-1w1.
- Note 3: If loading more than 16 damaged assemblies, place the first 57 damaged assemblies in the interior/edge "C" and the interior "B" locations. Place the remaining four intact or damaged assemblies in the corner "A" locations. The maximum lattice average initial enrichments of assemblies is limited to the "Up to 4 Intact Assemblies" or "Up to 4 Damaged Assemblies" column of Table 1-1x.

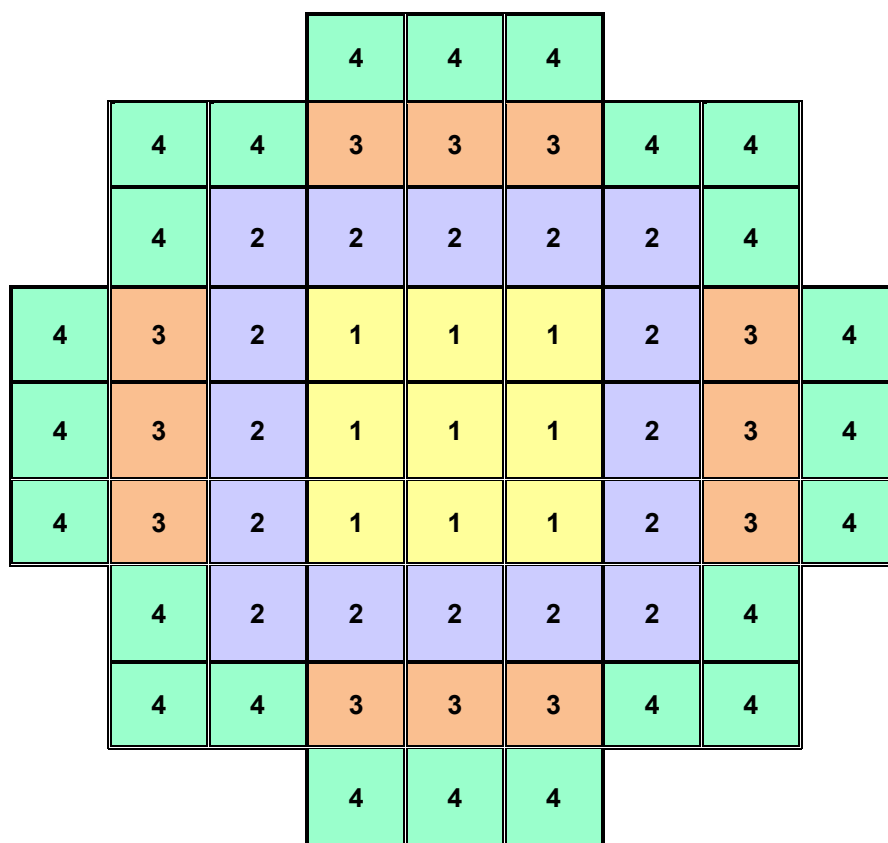
Figure 1-25
Location of Damaged and Failed Fuel Assemblies inside 61BTH DSC



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	0.393	0.48	0.35	0.35
Maximum Decay Heat per Zone (kW)	3.54	7.68	4.2	8.4
Maximum Decay Heat per DSC (kW)	22.0 ⁽¹⁾			

Note 1: Adjust payload to maintain total canister heat load within the specified limit.

Figure 1-25a
Heat Load Zoning Configuration No. 9 for Type 1 or Type 2 61BTH DSC

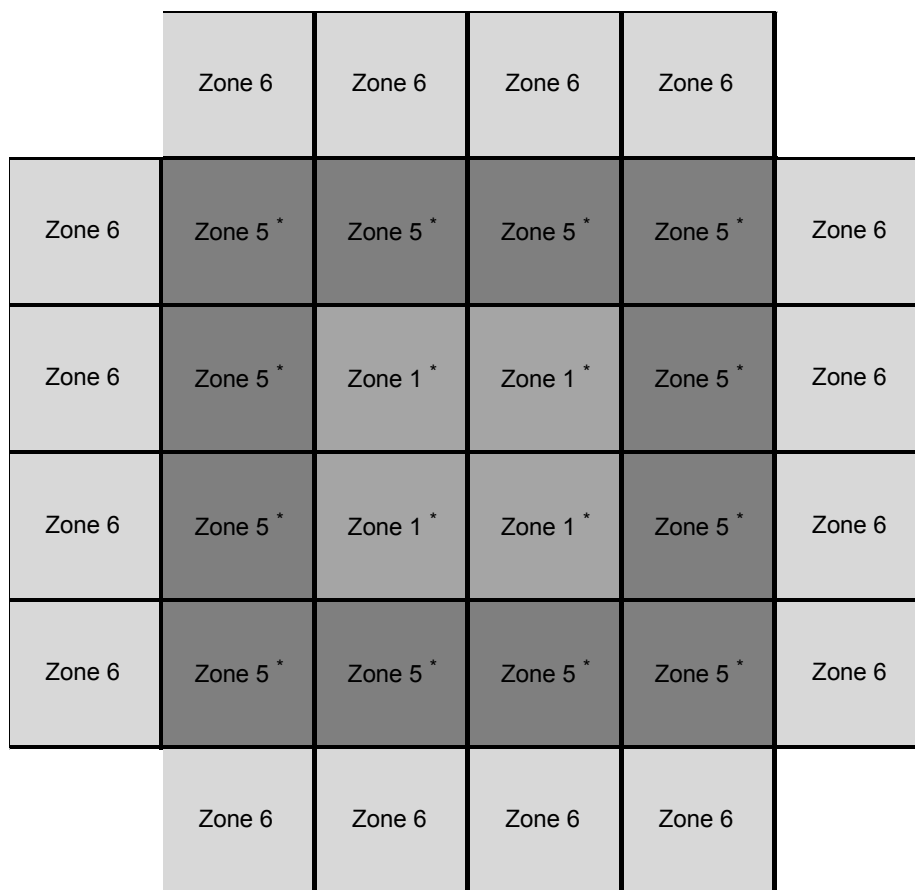


	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)	0.393	0.48 ⁽²⁾	1.20 ⁽²⁾	0.48 ⁽²⁾
Maximum Decay Heat per Zone (kW)	3.54	7.68	14.4	11.52
Maximum Decay Heat per DSC (kW)	31.2 ⁽¹⁾			

Note 1: Adjust payload to maintain total canister heat load within the specified limit.

Note 2: If the maximum decay heat per SFA in Zone 3 is greater than 0.9 kW, the maximum decay heat per FA in Zone 2 and Zone 4 shall be less than or equal to 0.393 kW.

Figure 1-25b
Heat Load Zoning Configuration No. 10 for Type 2 61BTH DSC



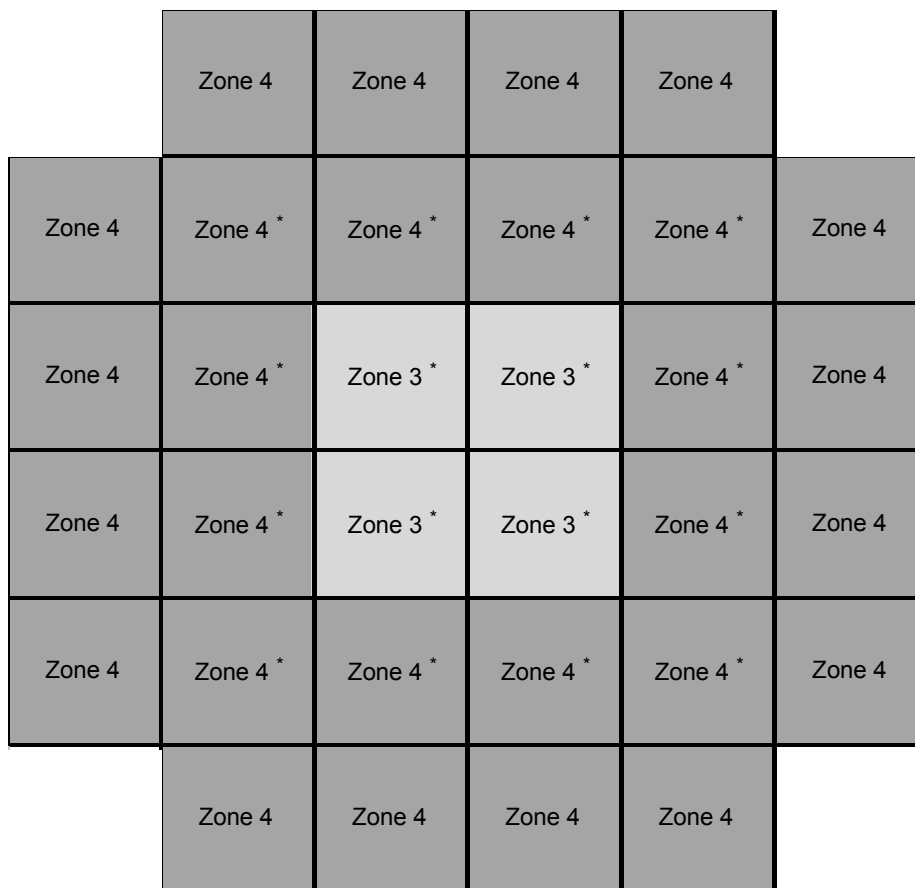
* denotes location where INTACT or DAMAGED FUEL ASSEMBLY can be stored.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Max. Decay Heat / FA (kW)	0.6	N/A	N/A	N/A	1.3 ⁽¹⁾	1.5
Max. Decay Heat / Zone (kW)	2.4	N/A	N/A	N/A	15.6	24.0
Max. Decay Heat / DSC (kW)	40.8 ⁽²⁾					

Notes:

- 1: 1.2 kW per FA is the maximum decay heat allowed for damaged fuel assemblies.
- 2: Adjust payload to maintain 40.8 kW heat load.

Figure 1-26
Heat Load Zoning Configuration Number 1 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 Baskets)



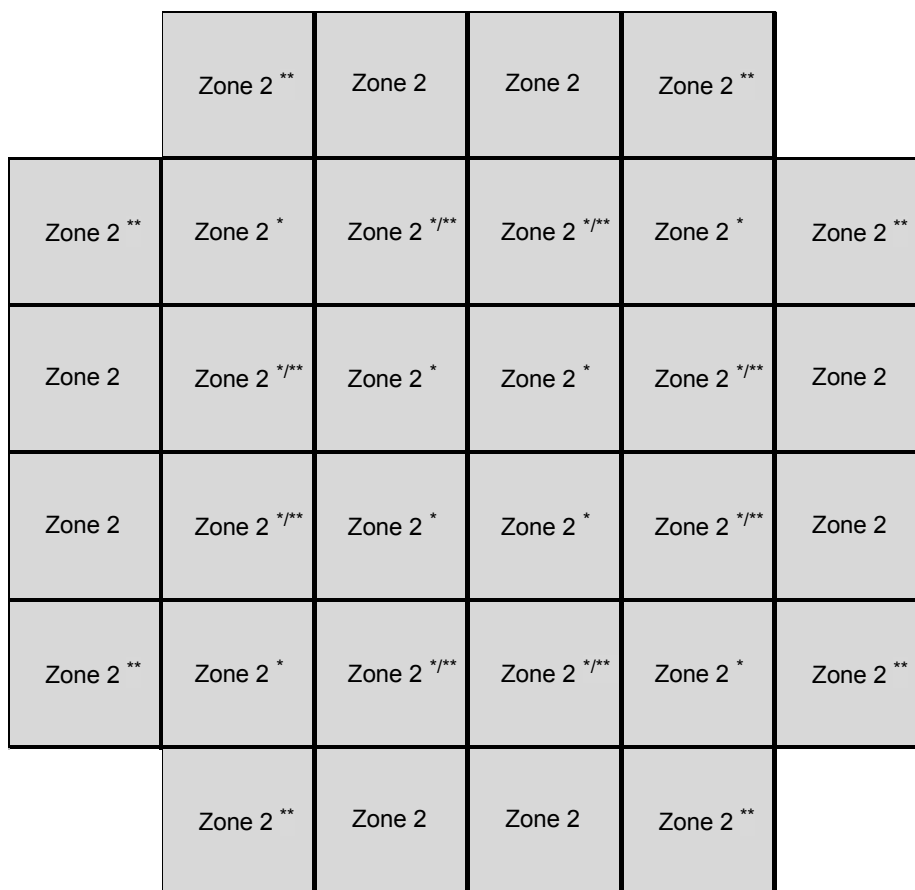
* denotes location where INTACT or DAMAGED FUEL ASSEMBLY can be stored.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Max. Decay Heat / FA (kW)	N/A	N/A	0.96 ⁽²⁾	0.98 ⁽²⁾	N/A	N/A
Max. Decay Heat / Zone (kW)	N/A	N/A	3.84	27.44	N/A	N/A
Max. Decay Heat / DSC (kW)	31.2 ⁽¹⁾					

Notes:

- 1: Adjust payload to maintain 31.2 kW heat load.
- 2: The fuel qualification table corresponding to 1.0 kW/FA shall be used to determine burnup, cooling time, and enrichments corresponding to these heat loads.

Figure 1-27
Heat Load Zoning Configuration Number 2 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 or Type 2 Baskets)



* denotes location where INTACT or DAMAGED FUEL ASSEMBLY can be stored.

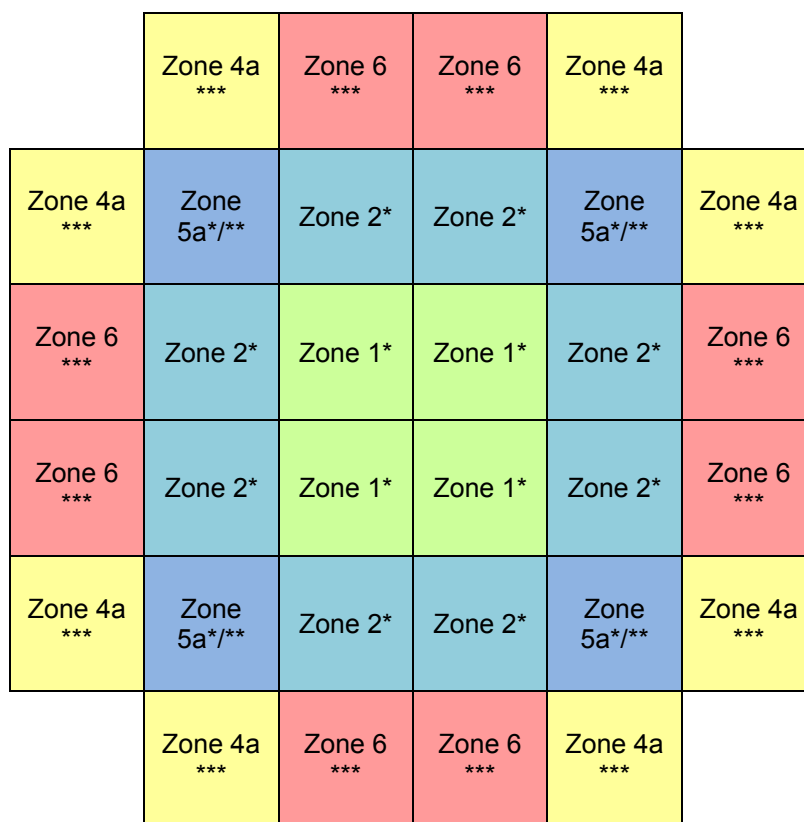
** denotes location where FAILED FUEL can be stored.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Max. Decay Heat / FA (kW)	N/A	0.8	N/A	N/A	N/A	N/A
Max. Decay Heat / Zone (kW)	N/A	24.0	N/A	N/A	N/A	N/A
Max. Decay Heat / DSC (kW)	24.0 ^{(1) (2)}					

Notes:

- 1: Adjust payload to maintain total canister heat load within the specified limit.
- 2: If FAILED FUEL is stored, the maximum canister heat load is 12.8 kW.
- 3: If FAILED FUEL is stored at any location denoted by **, INTACT FUEL ASSEMBLIES shall not be stored in any Zone 2 location, and in addition DAMAGED FUEL ASSEMBLIES shall not be stored in any location denoted by *.
- 4: If FAILED FUEL is stored at any location denoted by **, the remaining ** locations shall be loaded with either FAILED FUEL, Dummy Assemblies or remain empty.

Figure 1-28
Heat Load Zoning Configuration Number 3 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 or Type 2 Baskets)



* denotes an interior location where a DAMAGED FUEL ASSEMBLY can be stored.

** denotes location where failed fuel can (FFC) can be stored.

*** denotes a periphery location where a DAMAGED FUEL ASSEMBLY can be stored.

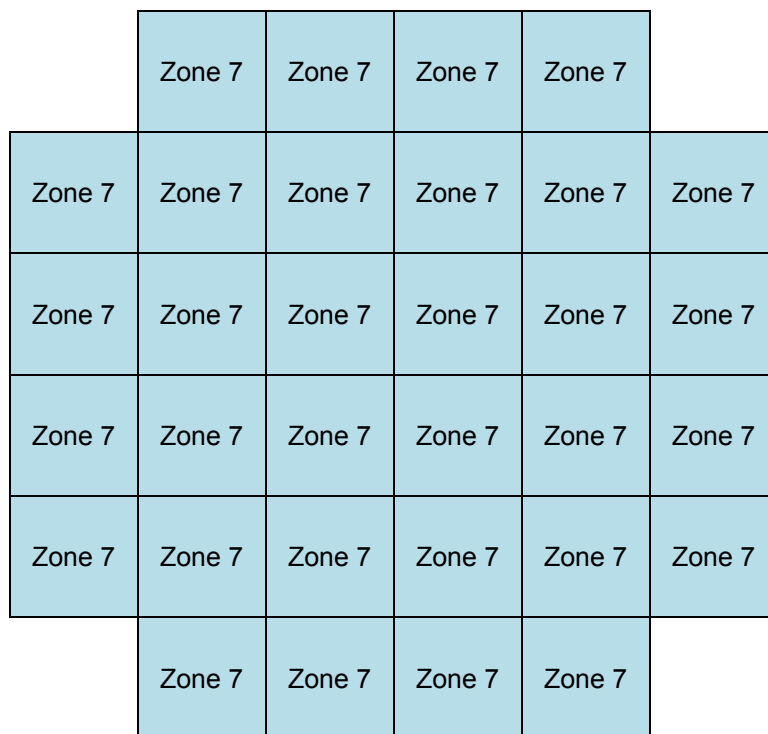
	Zone 1	Zone 2	Zone 3	Zone 4a	Zone 5a	Zone 6
Max. Decay Heat /FA (kW)	0.6	0.8	N/A	1.0	1.2 ⁽¹⁾	1.5
Max. Decay Heat /Zone (kW)	2.4	6.4	N/A	8.0	4.8	12
Max. Decay Heat / DSC (kW)	31.2 kW ⁽²⁾					

Notes: (1) The maximum allowable heat load per FFC is 0.8 kW.

(2) Adjust payload to maintain total canister heat load within the specified limit.

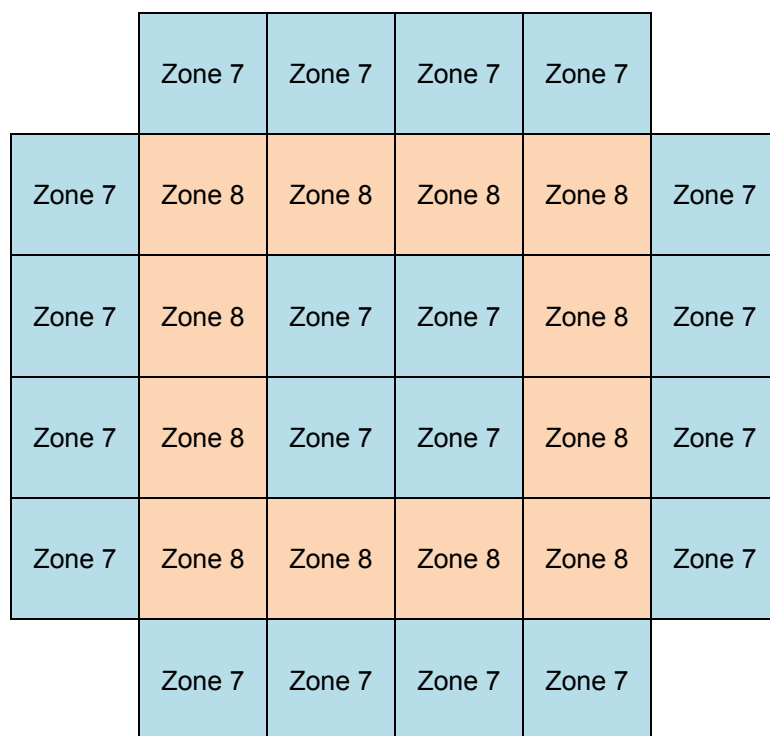
(3) DAMAGED FUEL ASSEMBLIES may be loaded in locations denoted by * or ***, but not both. If a DAMAGED FUEL ASSEMBLY is loaded in a location denoted by ***, FFC shall not be stored.

Figure 1-28a
Heat Load Zoning Configuration No. 4 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 or Type 2 Baskets)



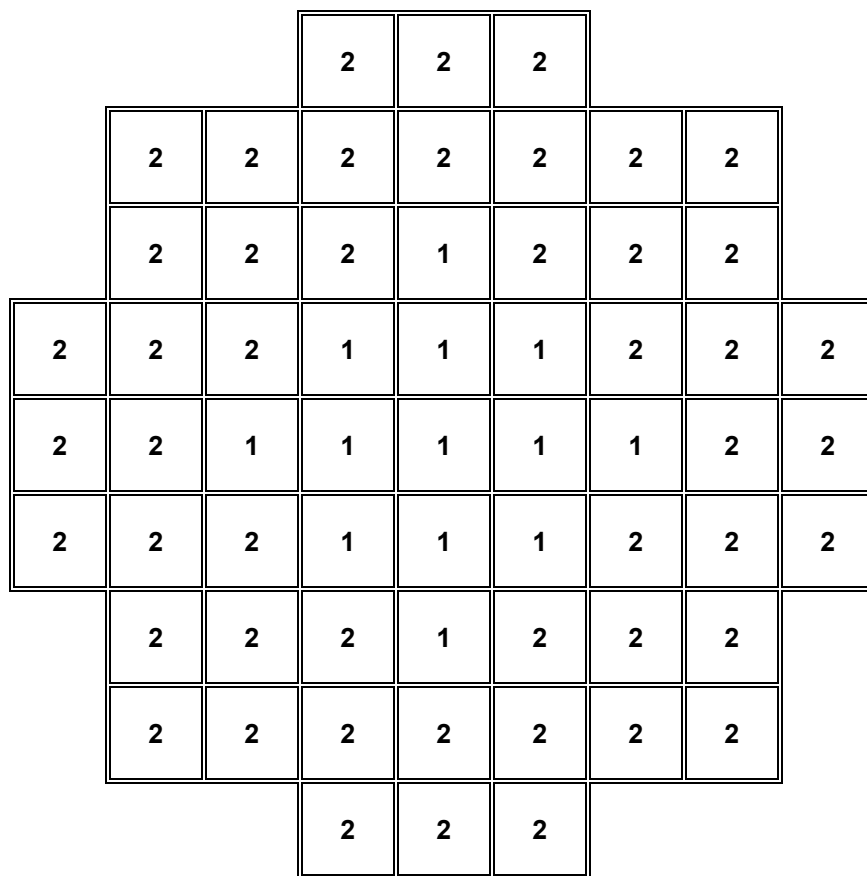
	Zone 7
Max. Decay Heat /FA (kW)	1.1
Max. Decay Heat / Zone (kW)	35.2
Max. Decay Heat / DSC (kW)	35.2

Figure 1-28b
Heat Load Zoning Configuration No. 5 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 Basket)



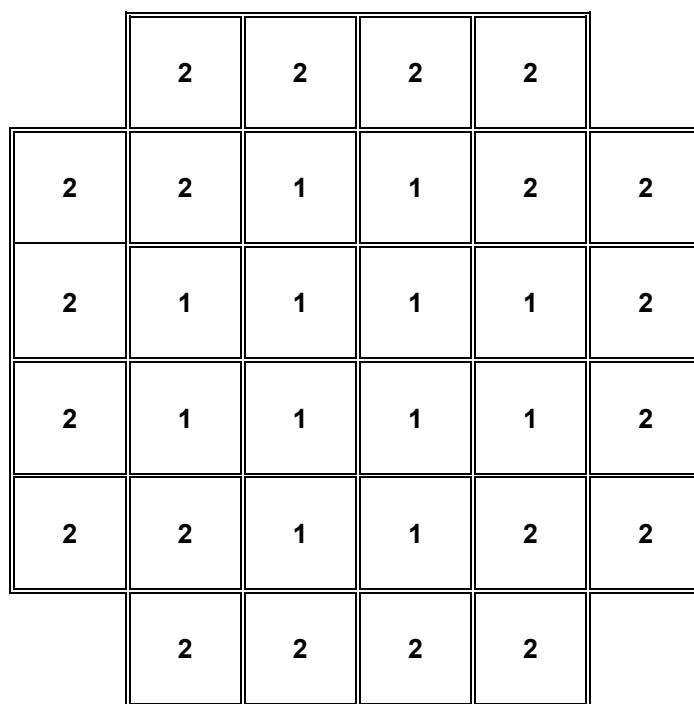
	Zone 7	Zone 8
Max. Decay Heat /FA (kW)	1.1	1.3
Max. Decay Heat / Zone (kW)	22.0	15.6
Max. Decay Heat / DSC (kW)	37.6	

Figure 1-28c
Heat Load Zoning Configuration No. 6 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 Basket)



Heat Zone Level	Zone 1	Zone 2
Max. Decay Heat/FA (kW)	0.3	0.17
Number of FAs/Zone	13	48
Max. Decay Heat/Zone (kW)	3.9	8.2
Max. Decay Heat/DSC (kW)	12.0	

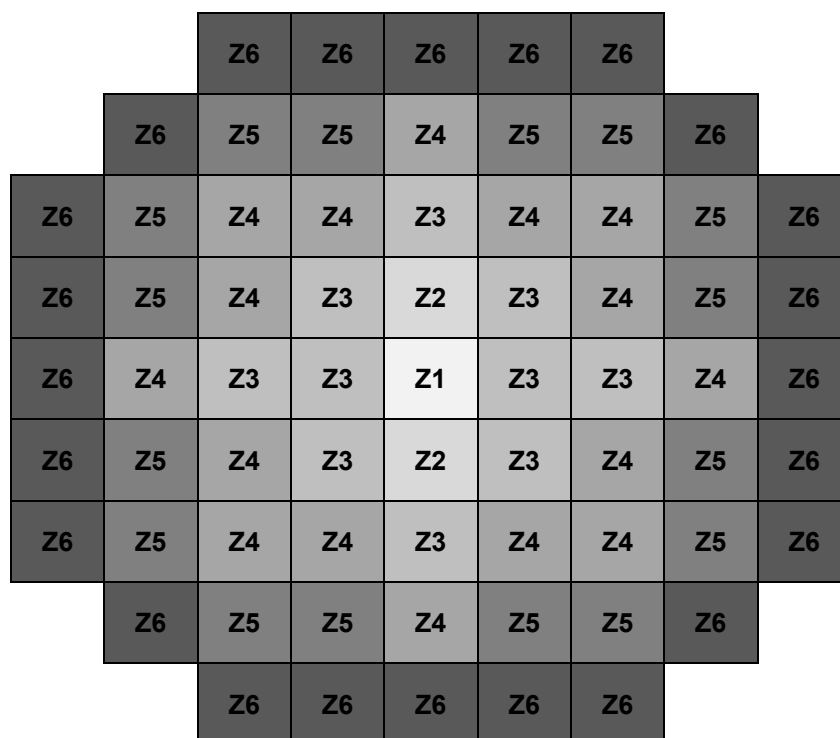
Figure 1-29
Heat Load Zone Configuration for the 61BT DSC Contained in an OS197L TC



Heat Zone Level	Zone 1	Zone 2
Max. Decay Heat/FA (kW)	0.6	0.4
Number of FAs/Zone	12	20
Max. Decay Heat/Zone (kW)	7.2	8.0
Max. Decay Heat/DSC (kW)	13.0 ⁽¹⁾	

⁽¹⁾ Maximum decay heat load allowed in the OS197L TC.

Figure 1-30
Heat Load Zone Configuration for the 32PT DSC Contained in an OS197L TC



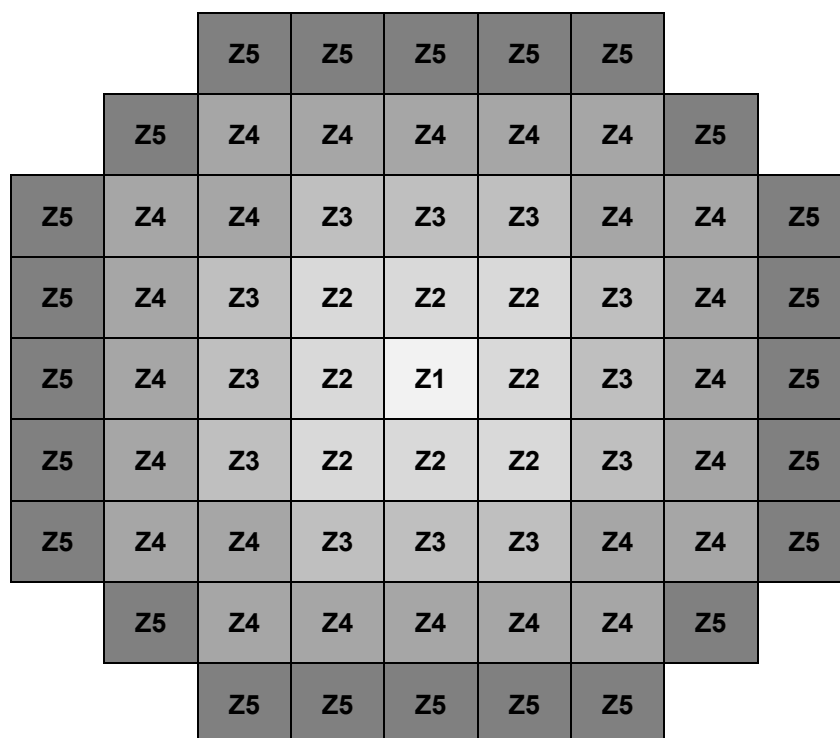
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Max. Decay Heat (kW/FA) ⁽³⁾	0.10	0.27	0.30	0.40	0.55	0.45
Number of Fuel Assemblies ⁽¹⁾	1	2	10	16	16	24
Max. Decay Heat per Zone (kW) ⁽³⁾	0.10	0.54	3.0	6.4	8.8	10.8
Max. Decay Heat per DSC (kW)	26.0 ⁽²⁾⁽³⁾					

⁽¹⁾ Total number of fuel assemblies is 69.

⁽²⁾ Adjust payload to maintain the total DSC heat load within the specified limit.

⁽³⁾ Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 18.2 kW per DSC.

Figure 1-31
Heat Load Zoning Configuration Number 1 for 69BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) ⁽⁴⁾	0.25	0.0 ⁽¹⁾	0.40	0.60	0.50
Number of Fuel Assemblies ⁽²⁾	1	0	12	24	24
Max. Decay Heat per Zone (kW) ⁽⁴⁾	0.25	0	4.8	14.4	12.0
Max. Decay Heat per DSC (kW)	26.0 ^{(3) (4)}				

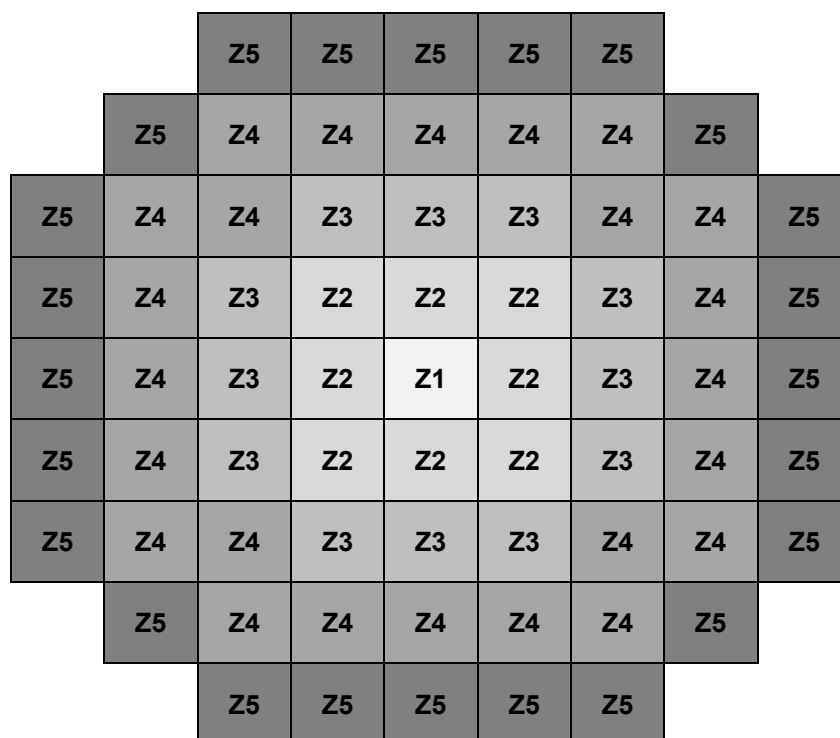
⁽¹⁾ Aluminum dummy assemblies replace the fuel assemblies in Zone 2.

⁽²⁾ Total number of fuel assemblies is 61.

⁽³⁾ Adjust payload to maintain the total DSC heat load within the specified limit.

⁽⁴⁾ Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 18.2 kW per DSC.

Figure 1-32
Heat Load Zoning Configuration Number 2 for 69BTH DSCs



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) ⁽⁴⁾	0.25	0.0 ⁽¹⁾	0.40	0.60	0.50
Number of Fuel Assemblies ⁽²⁾	1	0	12	24	24
Max. Decay Heat per Zone (kW) ⁽⁴⁾	0.25	0	4.8	14.4	12.0
Max. Decay Heat per DSC (kW)	29.2 ⁽³⁾ ⁽⁴⁾				

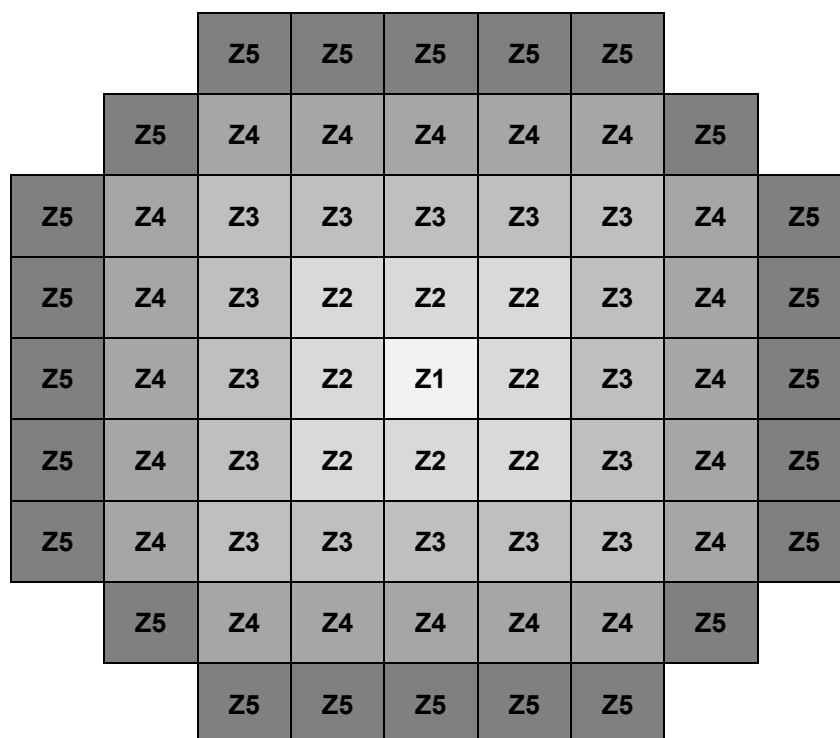
⁽¹⁾ Aluminum dummy assemblies replace the fuel assemblies in Zone 2.

⁽²⁾ Total number of fuel assemblies is 61.

⁽³⁾ Adjust payload to maintain the total DSC heat load within the specified limit.

⁽⁴⁾ Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 20.4 kW per DSC.

Figure 1-33
Heat Load Zoning Configuration Number 3 for 69BTH DSCs



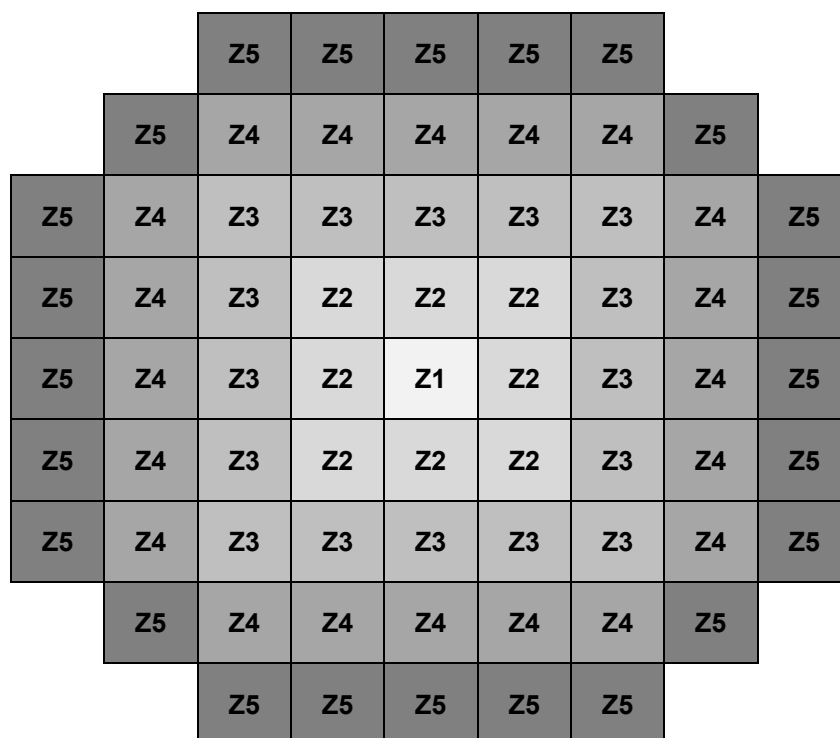
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) ⁽³⁾	0.0 ⁽¹⁾	0.45	0.0 ⁽¹⁾	0.70	0.60
Number of Fuel Assemblies ⁽²⁾	0	8	0	20	24
Max. Decay Heat per Zone (kW) ⁽³⁾	0	3.6	0	14.0	14.4
Max. Decay Heat per DSC (kW)	32.0 ⁽³⁾				

⁽¹⁾ The fuel compartment in Zone 1 remains empty. Aluminum dummy assemblies replace the fuel assemblies in Zone 3.

⁽²⁾ Total number of fuel assemblies is 52.

⁽³⁾ Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 22.4 kW per DSC.

Figure 1-34
Heat Load Zoning Configuration Number 4 for 69BTH DSCs

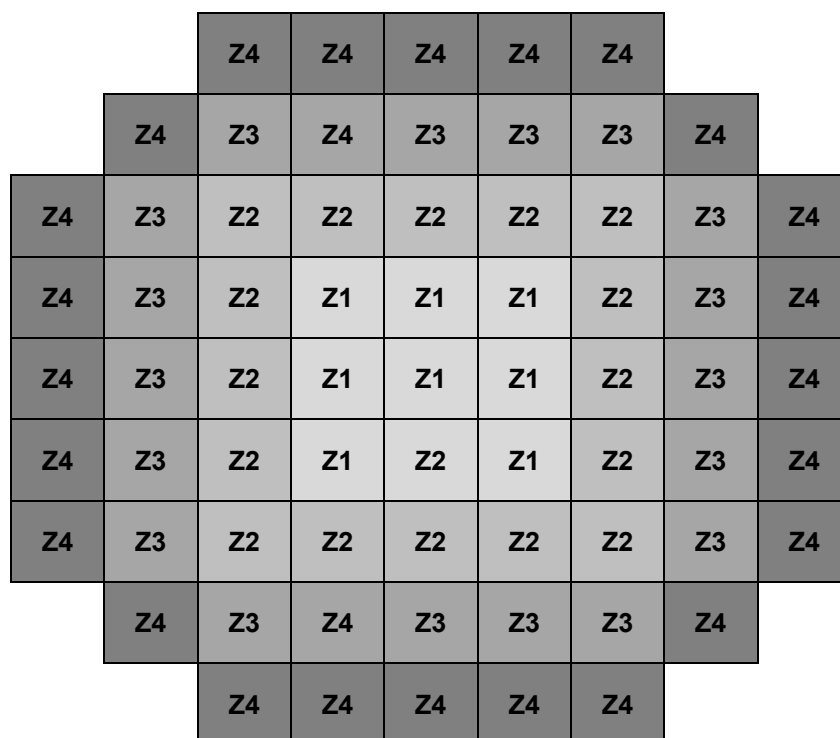


	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) ⁽²⁾	0.22	0.35	0.393	0.70	0.488
Number of Fuel Assemblies ⁽¹⁾	1	8	16	20	24
Max. Decay Heat per Zone (kW) ⁽²⁾	0.22	2.80	6.29	14.00	11.71
Max. Decay Heat per DSC (kW)	35.0 ⁽²⁾				

⁽¹⁾ Total number of fuel assemblies is 69.

⁽²⁾ Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 24.5 kW per DSC.

Figure 1-35
Heat Load Zoning Configuration Number 5 for 69BTH DSC

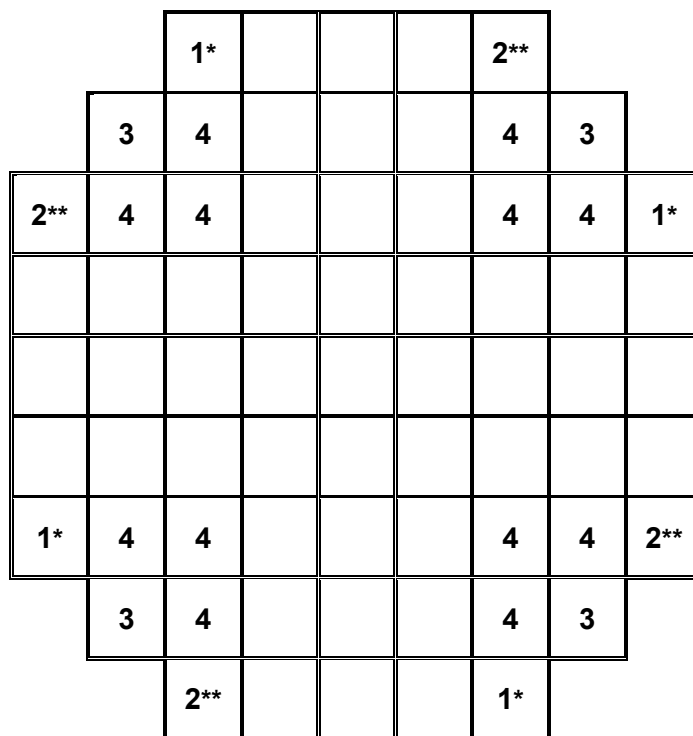


	Zone 1	Zone 2	Zone 3	Zone 4
Max. Decay Heat (kW/FA) ⁽²⁾	0.22	0.35	0.393	0.35
Number of Fuel Assemblies ⁽¹⁾	9	16	20	24
Max. Decay Heat per Zone (kW) ⁽²⁾	1.98	5.6	7.86	8.40
Max. Decay Heat per DSC (kW)	24.0 ⁽²⁾			

⁽¹⁾ Total number of fuel assemblies is 69.

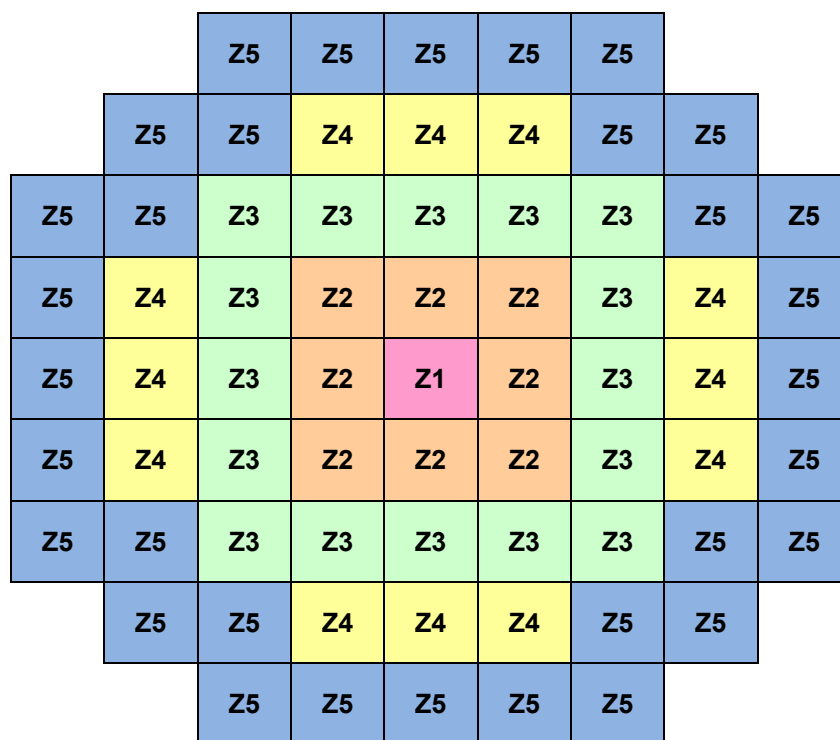
⁽²⁾ Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 16.8 kW per DSC.

Figure 1-36
Heat Load Zoning Configuration Number 6 for 69BTH DSC

Configurations⁽¹⁾ 1, 2, 3, and 4

Note (1)	Any one of these three sets of corner locations shall only be utilized to load up to four damaged assemblies with the remaining intact in a 69BTH Basket. The maximum lattice average initial enrichment of fuel assemblies (damaged or intact stored in either set of cells for configuration 1 or configuration 2, or set of cells for configuration 3) is limited to the “up to 4 damaged assemblies” column of Table 1-1kk.
	Following the placement of damaged fuel assemblies in either configuration 1 or 2, the remaining configuration 2 or configuration 1 locations shall be used to load up to 4 additional damaged assemblies, with the remaining intact in a 69BTH Basket. The maximum lattice average initial enrichment for these fuel assemblies (damaged or intact stored in configuration 2 or configuration 1 cells available) is limited to the “5 to 8 damaged assemblies” column of Table 1-1kk.
	Following the placement of eight damaged fuel assemblies in the set of corner locations marked with a “*” (configuration 1 cells) and a “**” (configuration 2 cells), the locations in configuration 4 cells or configuration 3 cells shall be used to load up to sixteen additional damaged assemblies, with the remaining intact in a 69BTH Basket. The maximum lattice average initial enrichment for all 24 fuel assemblies (damaged or intact stored in these 24 locations) is limited to the “9 to 24 Damaged Assemblies” column of Table 1-1kk.

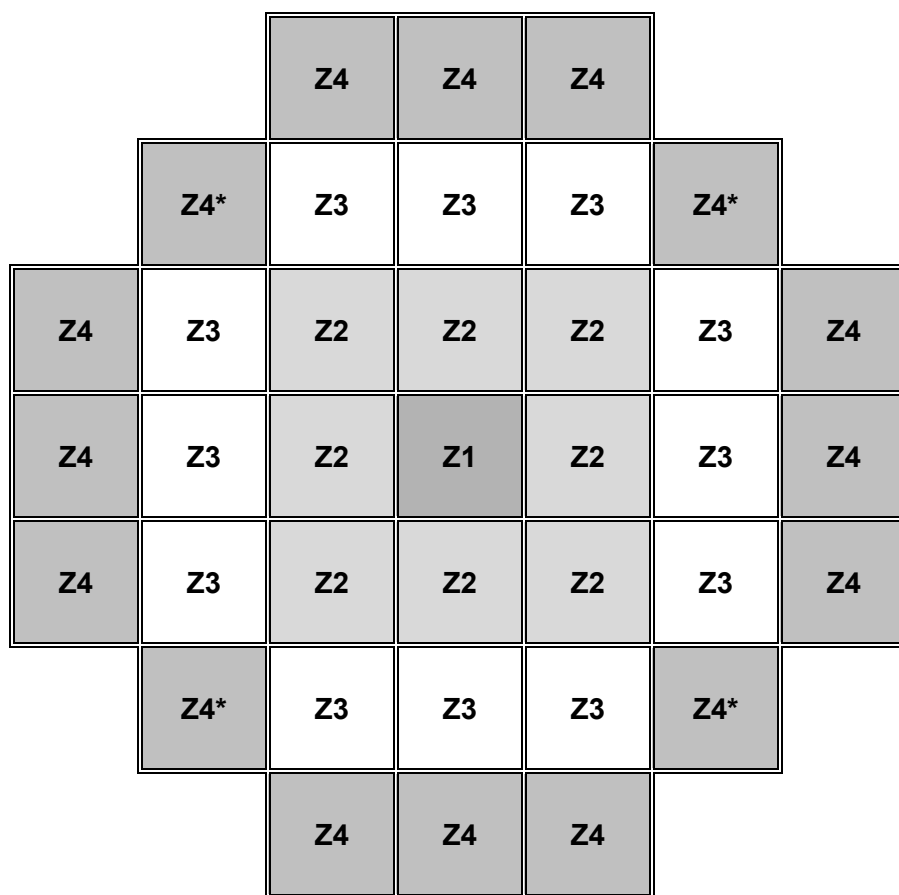
Figure 1-37
Location of Damaged Fuel Assemblies Inside 69BTH DSC



	Zone 1 ⁽³⁾	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) ⁽⁴⁾	0	0.35	0.40	0.9	0.5
No. of Fuel Assemblies ⁽¹⁾	0	8	16	12	32
Max. Decay Heat per Zone (kW)	0	2.80	6.4	10.8	16.0
Max. Decay Heat per DSC (kW)	35.0 ^{(2) (4)}				

- (1) Total number of fuel assemblies is 68 for HLZC #7
 (2) Adjust payload to maintain the total DSC heat load within the specified limit
 (3) Zone 1 does not require an aluminum dummy assembly.
 (4) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 24.5 kW per DSC

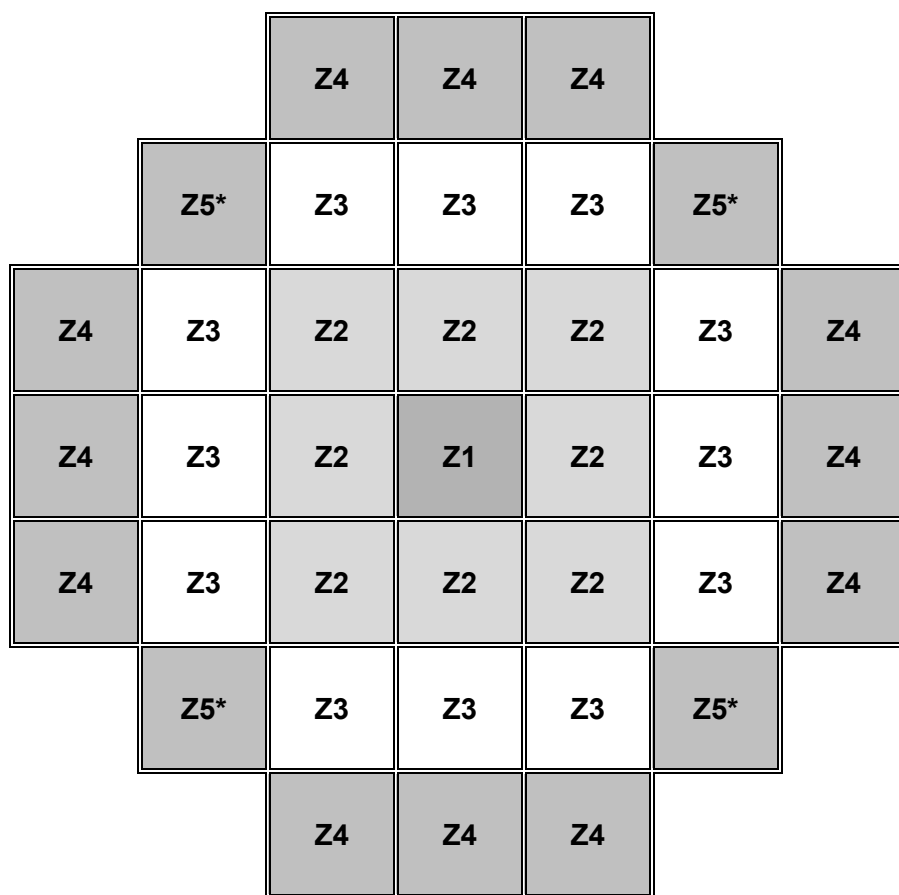
Figure 1-38
Heat Load Zoning Configuration No. 7 for 69BTH DSCs



* Denotes locations where damaged fuel assembly can be stored.

	Zone 1	Zone 2	Zone 3	Zone 4
Max. decay heat (kW/FA)	0.40	0.40	0.60	0.70
Number of fuel assemblies	1	8	12	16
Max. decay heat per zone (kW)	0.4	3.2	7.2	11.2
Max. decay heat per DSC (kW)	22.0			

Figure 1-39
Heat Load Zoning Configuration Number 2 for 37PTH-S and 37PTH-M DSCs



* Denotes locations where either an intact or damaged fuel assembly can be stored.

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. decay heat (kW/FA)	0.40	0.40	0.70	1.20	1.20
Number of fuel assemblies	1	8	12	12	4
Max. decay heat per zone (kW)	0.4	3.2	8.4	14.4	4.80
Max. decay heat per DSC (kW)	30.0 ⁽¹⁾				

⁽¹⁾ Adjust payload of fuel assemblies to maintain the total DSC heat load within the specified limit.

Figure 1-40
Heat Load Zoning Configuration Number 3 for 37PTH-S and 37PTH-M DSCs

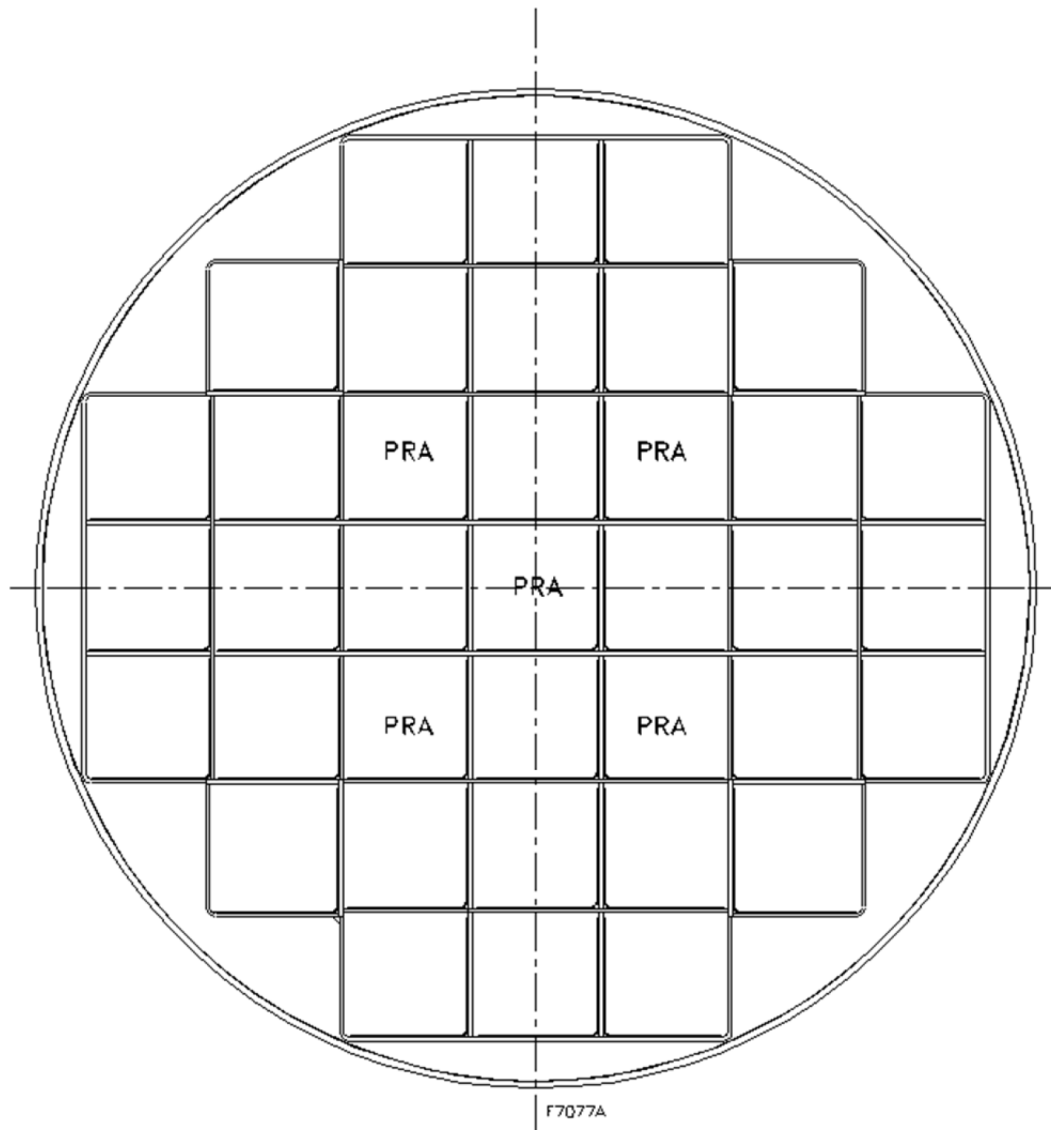


Figure 1-41
Required PRA Locations for the NUHOMS®-37PTH DSC Configuration with Five PRAs

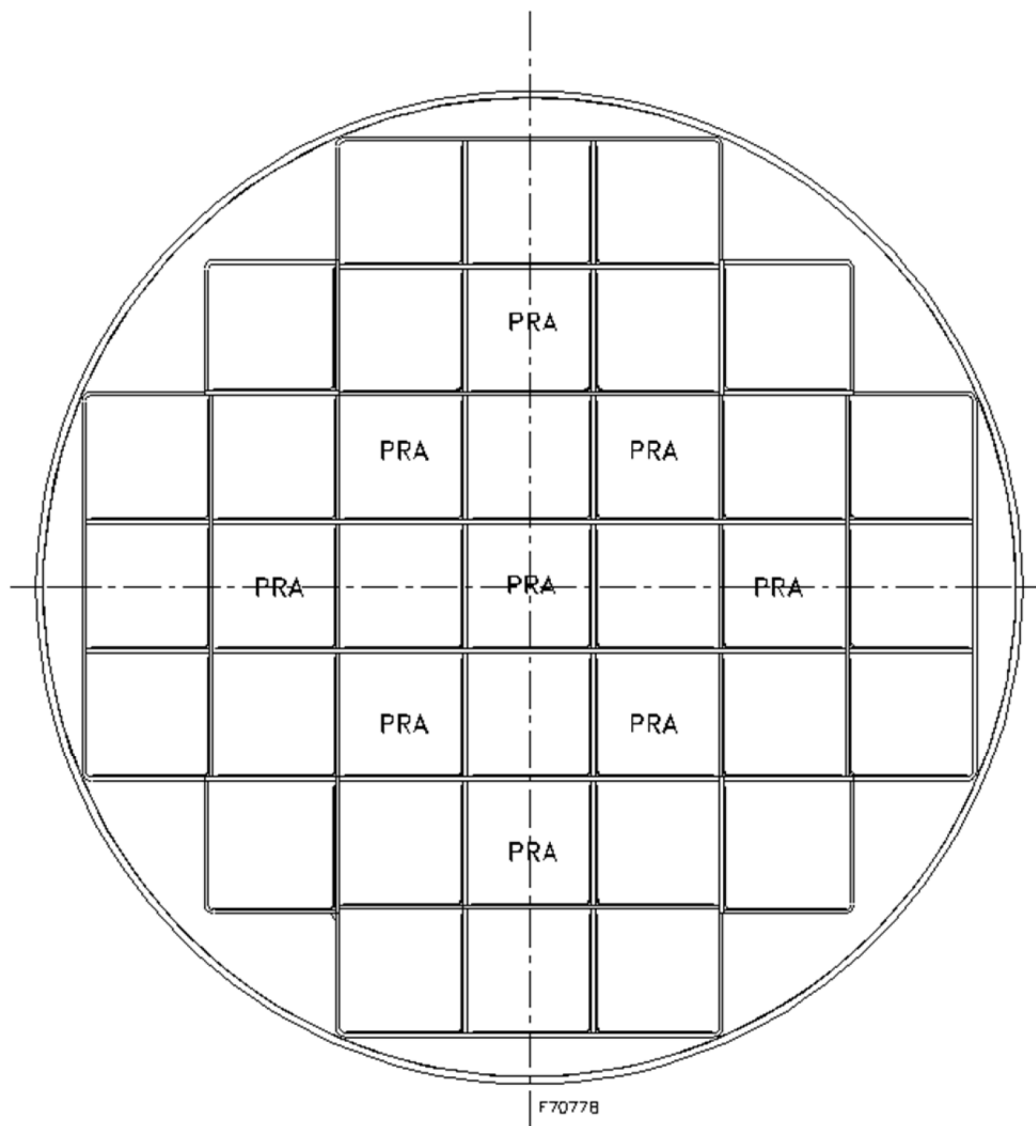


Figure 1-42
Required PRA Locations for the NUHOMS®-37PTH DSC Configuration with Nine PRAs