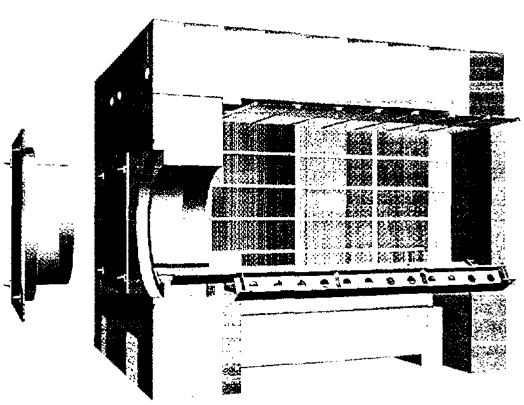
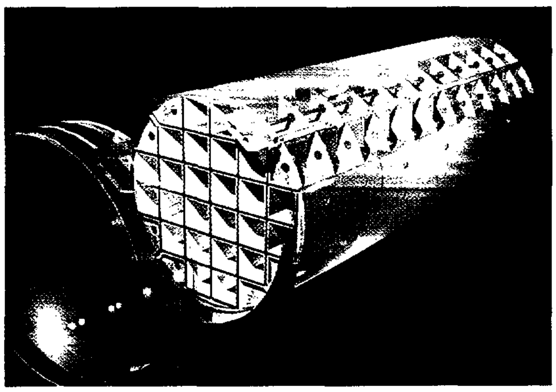
TRANSNUCLEAR

AMENDMENT NO. 8
ADDITION OF 24PTH DSC

TO
NUHOMS® COC 1004
DSC TO STANDARDIZED NUHOMS® SYSTEM





Volume 1 of 2

NON-PROPRIETARY

<u>ATTACHMENT A</u>

Description, Justification, and Evaluation of COC Amendment Changes

ATTACHMENT A

DESCRIPTION, JUSTIFICATION AND EVALUATION OF AMENDMENT CHANGES

1.0 INTRODUCTION

The purpose of this amendment application is to add a new NUHOMS®-24PTH system to the Standardized NUHOMS® system described in the FSAR. The NUHOMS®-24PTH system is a modular canister based spent fuel storage and transfer system, similar to the Standardized NUHOMS®-24P system described in the FSAR. The NUHOMS®-24PTH system consists of the following new or modified components:

- A new dual purpose (Storage/Transportation) Dry Shielded Canister (DSC), with three alternate configurations, designated as DSC Type NUHOMS®-24PTH-S, -24PTH-L, and -24PTH-S-LC,

- A new 24PTH DSC basket design, which is provided with two alternate options: with aluminum inserts (Type 1) or without aluminum inserts (Type 2). In addition, depending on the boron content in the basket poison plates, each basket type is designated as Type A (low B10), Type B (moderate B10) or Type C (high B10) which results in six different basket types (Type 1A, 1B, 1C, 2A, 2B, or 2C),

- A modified version of the Standardized Horizontal Storage Module (HSM) Model 102 described in the FSAR, designated as HSM-H, equipped with special design features which provide enhanced shielding and heat rejection capabilities, and

- The OS197/OS197H Transfer Cask (TC) described in the FSAR, is provided with an optional modified top lid to allow air circulation through the TC/DSC annulus during transfer operations at certain heat loads when time limits for transfer operations cannot be satisfied. The OS197/OS197H TC with a modified top lid is designated as OS197FC TC.

The NUHOMS®-24PTH system is designed to store up to 24 intact (or up to 12 damaged and balance intact) B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14, and WE 14x14 class PWR fuel assemblies. The fuel to be stored is limited to a maximum assembly average initial enrichment of 5.0 wt. %, a maximum assembly average burn up of 62 GWd/MTU, and a minimum cooling time of 3.0 years. The 24PTH-S and 24PTH-L DSC types are the short and long cavity configurations of the 24PTH DSC designed for a maximum heat load of 40.8 kW. They are transferred to the ISFSI for storage in the HSM-H in either the OS197/OS197H or OS197FC TC depending upon the heat load.

To meet the capacity limits of the lifting crane at the Oconee Station, a third DSC type, designated 24PTH DSC-S-LC, is provided. This is a modified version of the 24PTH-S DSC, provided with thinner top and bottom lead shield plugs instead of steel, resulting in a longer cavity length. It is designed for a maximum heat load of 24 kW per DSC and may be stored in either the currently licensed Standardized HSM Model 102, or in the new HSM-H, and is to used with the currently licensed Standardized TC (with a solid neutron shield) only for onsite transfer.

Fuel assemblies with Control Components (CCs) are to be stored only in 24PTH-L and 24PTH-S-LC DSC Types, due to their longer cavity length.

This section of the application provides (1) a brief description of the changes, (2) justification for the change, and (3) a safety evaluation for this change.

2.0 BRIEF DESCRIPTION OF THE CHANGE

2.1 Significant Changes to the Technical Specifications of NUHOMS® CoC 1004, Amendment 7

The changes listed below are relative to CoC Amendment 7, which is currently pending final rulemaking:

A complete mark up of the changes to the Technical Specifications due to the addition of the NUHOMS®-24PTH system to CoC 1004 is included as Attachment B in Enclosures 2 and 3 of this submittal. A few of the proposed changes listed here correct errors, inconsistencies and/or discrepancies within the existing Specifications. None of these corrections have any significant effect on safety. A brief justification for each of such suggested corrections to the Specifications is also provided herewith.

- Revise "Limit/Specification" and "Action" sections of Specification 1.2.1, "Fuel Specification", to add reference to Tables 1-1l, and 1-1m. Table 1-1l , and 1-1m specify the applicable parameters for each type of PWR fuel allowed to be stored in the NUHOMS®-24PTH system.

- Revise the "Surveillance" section of Specification 1.2.1, Fuel Specification", to say "*Prior to loading*....." instead of "Immediately before insertion...". to allow operational flexibility to a Cask user. There is no change to the requirement of independent identification and verification of each assembly being placed into the DSC.

- Revise the "Bases" section of Specification 1.2.1, "Fuel Specification", to provide the supporting bases for storage of intact and/or damaged PWR fuel, with or without Control Components (CCs) in the NUHOMS®-24PTH DSC. Add a cross reference to Appendix P where the safety analyses for the 24PTH are provided.

- Add Table 1-1l to identify the acceptable parameters for each type of intact PWR fuel assembly class allowed to be stored in the NUHOMS®-24PTH DSC.

- Add Table 1-1m to specify PWR fuel assembly design characteristics for storage into NUHOMS®-24PTH DSC.

- Add Table 1-1n to specify the thermal and radiological characteristics for CCs authorized for storage in the NUHOMS®-24PTH DSC.

- Add Table 1-1p to specify the maximum assembly average initial enrichment for which each intact fuel assembly class (with or without CCs) is qualified as a function of soluble boron concentration and basket type (fixed boron).

- Add Table 1-1q to specify the maximum assembly average initial enrichment for which each damaged fuel assembly class (with or without CCs) is qualified as a function of soluble boron concentration and basket type (fixed boron) and the maximum number of damaged fuel assemblies allowed to be stored.

- Add Table 1-1r to specify the minimum B10 content of the poison plates as a function of the six NUHOMS®-24PTH basket types.

- Add Fuel Qualification Tables 1-3a, 1-3b, 1-3c, and 1-3d for the NUHOMS®-24PTH DSC (PWR Fuel without CCs).

- Add Fuel Qualification Tables 1-3e, 1-3f, 1-3g, and 1-3h for the NUHOMS®-24PTH DSC (PWR Fuel with CCs).

- Relocate the existing Figure 1-10 from its existing location (page A-65) to page A-63 as shown. This is an editorial change and represents a more logical location for this Figure in the Technical Specifications.

- Add Figures 1-11, 1-12, 1-13 and 1-14 to specify the four heat load zoning configurations analyzed for the 24PTH-S or 24PTH-L DSC. Add Figure 1-15 to specify the heat load zoning configuration analyzed for the 24PTH-S-LC DSC.

- Add Figure 1-16 to specify the location inside the NUHOMS®-24PTH DSC where up to 12 damaged fuel assemblies may be stored.

- Revise the Title and "Applicability" subsections of Specification 1.2.3a to extend the applicability of this specification to the 24PTH DSC.

- Revise Action Statement No. 5 of Specifications 1.2.3 and 1.2.3a to say "Check and repair the seal weld *between the inner top cover and the DSC shell*" instead of "Check and repair the seal weld on the DSC top shield plug". This revision corrects an administrative error in this Specification, since the inner top cover plate is the one that is welded to the DSC shell.

- Revise the title ,"Applicability" and the "Bases" sections of Specification 1.2.4a to extend the applicability of this specification to 24PTH DSC.

- Revise the Applicability Specification 1.2.5 to correct a spelling error of the term "siphon".

- Add a new Specification 1.2.7c, entitled "HSM-H Dose Rates with a Loaded 24PTH-S or 24PTH-L DSC Only", to specify the limiting doses rates due to the storage of a loaded 24PTH-S or 24PTH-L DSC inside the HSM-H.

- Add a new Specification 1.2.7d, entitled "HSM or HSM-H Dose Rates with a Loaded 24PTH-S-LC DSC Only", to specify the limiting doses rates due to the storage of a loaded 24PTH-S-LC DSC inside either the Standardized HSM or HSM-H.

- Revise the Title of Specification 1.2.8 to include 24PTH-S-LC DSC, since this DSC is authorized to be stored in the Standardized HSM. Also, revise the third sentence in the Action Statement of this Specification to say "...than the upper limit *in the Specification 1.2.1* ......" instead of "than the upper limit specified in Section 3 of the FSAR...". This is a betterment change.

- Add a new specification 1.2.8a, entitled "HSM-H Maximum Air Exit Temperature with a Loaded 24PTH DSC", to specify the limiting air exit temperature due to the storage of a NUHOMS®-24PTH DSC inside the HSM-H.

- Revise Specification 1.2.9 to reflect that the alignment requirements of the TC with the HSM as specified herein are also applicable to the HSM-H.

- Add a new Specification 1.2.11b, entitled "Transfer Cask Dose Rates with a Loaded 24PTH-S or 24PTH-L DSC", to specify the limiting doses rates due to the transfer of a loaded 24PTH-S or 24PTH-L DSC inside the Transfer Cask.

- Add a new Specification 1.2.11c, entitled "Transfer Cask Dose Rates with a Loaded 24PTH-S-LC DSC", to specify the limiting doses rates due to the transfer of a loaded 24PTH-S-LC inside the Transfer Cask.

- Revise Specification 1.2.12, Surveillance section to delete the last 2 sentences related to decontamination of the transfer cask. This change makes the Specification consistent with its Applicability section.

- Revise the second sentence of the "Bases" section of Specification 1.2.14, entitled "TC/DSC Operations at High Ambient Temperatures" to state that the fuel cladding limits of ISG-11, Rev. 2 also apply to the 24PTH system. Also, Item No. 2 of the Limit/Specification is revised to delete the words "*up to 125°F*", since the upper ambient temperature limit is different for each canister type as stated in paragraph 1.1.1, item 2 of CoC.

- For Specifications 1.2.15, 1.2.15a, and 1.2.15b, revise the surveillance activities No. 1 and 2 to reflect a time requirement of 24 hours instead of 4 hours for determination of boron concentration in the SFP water and the water inside DSC cavity. The current four hour requirement results in an increased exposure to the Cask user without providing a commensurate increase in public safety.

- Add a new Specification 1.2.15c, entitled "Boron Concentration in the DSC Cavity Water for the 24PTH Design Only", to specify the minimum boron concentration required during loading of the NUHOMS®-24PTH system.

- Revise the Limits/Specifications of Specification 1.2.16 to delete the additional constraint of "*and the fully loaded TC weight is less than 190 kips*" to make this Specification consistent with its Applicability statement.

- Add a new Specification 1.2.17c, entitled "24PTH DSC Vacuum Drying Duration Limit", to specify the vacuum drying duration limit for the NUHOMS®-24PTH DSC.

- Add a new Specification 1.2.18, entitled "Time Limit for Completion of 24PTH DSC Transfer Operation" to specify the limits for completion of transfer of a loaded NUHOMS®-24PTH DSC.

- Revise the Surveillance and Monitoring requirements of Specification 1.3 to eliminate the mandatory requirements of implementing both 1.3.1 and 1.3.2 on a daily basis. Implementation of any one of the two surveillance requirements is sufficient to accomplish the specified objective of this specification. Implementation of both requirements adds to the exposure requirements of the Cask user without providing a commensurate increase in public safety. In addition, revise Specifications 1.3.1 and 1.3.2 to show that the requirements of these Specifications apply to "HSM or HSM-H".

- Update Table 1.3.1 to reflect the changes as described above as applicable.

- Revise the Captions of Tables and Figures to delete underline, as applicable. This is a format change which makes the appearance of the document consistent. No change to the contents of the Specification.

2.2 Changes to NUHOMS® FSAR, Revision 6

Attachment C of this submittal includes a new FSAR Appendix P which has been prepared in a format consistent with the Standard Review Plan for Dry Cask Storage (NUREG 1536). It provides a description of the design features and a comprehensive evaluation of the new 24PTH system. It also documents the changes where applicable to the existing safety analyses provided in the FSAR.

3.0 JUSTIFICATION OF CHANGE

The NUHOMS®-24PTH System design has been developed based on research and development efforts driven by the needs of the commercial nuclear power industry. TN is in discussions with two utilities for dry storage systems using the 24PTH system. To support the needs of these utilities, fabrication of the 24PTH canisters is planned to begin in early 2004 to support initial use in mid 2005. Accordingly, TN requests that the staff assign appropriate priority for review of this application consistent with the issuance of an RAI, if needed, by February 2004.

4.0 EVALUATION OF CHANGE

TN has evaluated the NUHOMS®-24PTH system for structural, thermal, shielding, confinement and criticality adequacy and has concluded that the addition of the NUHOMS®-24PTH System to the standardized NUHOMS® System has no significant effect on safety. This evaluation is documented in Appendix P of the FSAR (Attachment C).

ATTACHMENT B

Suggested Changes to Technical Specifications of CoC 1004 Amendment No. 7

(CoC Changes implemented under CoC Amendment 7, which is currently in rule making, have been included as current configuration.)

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1.0 INTRODUCTION

This section presents the conditions which a potential user (general licensee) of the standardized NUHOMS® system must comply with, in order to use the system under the general license in accordance with the provisions of 10 CFR 72.210 and 10 CFR 72.212. These conditions have either been proposed by the system vendor, imposed by the NRC staff as a result of the review of the FSAR, or are part of the regulatory requirements expressed in 10 CFR 72.212.

1.1 General Requirements and Conditions

1.1.1 Regulatory Requirements for a General License

Subpart K of 10 CFR Part 72 contains conditions for using the general license to store spent fuel at an independent spent fuel storage installation at power reactor sites authorized to possess and operate nuclear power reactors under 10 CFR Part 50. Technical regulatory requirements for the licensee (user of the standardized NUHOMS® system) are contained in 10 CFR 72.212(b).

Under 10 CFR 72.212(b)(2) requirements, the licensee must perform written evaluations, before use, that establish that: (1) conditions set forth in the Certificate of Compliance have been met; (2) cask storage pads and areas have been designed to adequately support the static load of the stored casks; and (3) the requirements of 10 CFR 72.104 "Criteria for radioactive materials in effluent and direct radiation from an ISFSI or MRS," have been met. In addition, 10 CFR 72.212(b)(3) requires that the licensee review the FSAR and the associated SER, before use of the general license, to determine whether or not the reactor site parameters (including earthquake intensity and tornado missiles), are encompassed by the cask design bases considered in these reports.

The requirements of 10 CFR 72.212(b)(4) provide that, as a holder of a Part 50 license, the user, before use of the general license under Part 72, must determine whether activities related to storage of spent fuel involve any unreviewed safety issues, or changes in technical specifications as provided under 10 CFR 50.59. Under 10 CFR 72.212(b)(5), the general license holder shall also protect the spent fuel against design basis threats and radiological sabotage pursuant to 10 CFR 73.55. Other general license requirements dealing with review of reactor emergency plans, quality assurance program, training, and radiation protection program must also be satisfied pursuant to 10 CFR 72.212(b)(6). Records and procedural requirements for the general license holder are described in 10 CFR 72.212(b)(7), (8), (9) and (10).

Without limiting the requirements identified above, site-specific parameters and analyses, identified in the SER, that will need verification by the system user, are as a minimum, as follows:

1. The temperature of 70°F as the maximum average yearly temperature with solar incidence. The average daily ambient temperature shall be 100°F or less.

2. The temperature extremes either of 125°F with incident solar radiation (for the 24P, 52B, and 61BT DSCs) or 117°F with solar incidence (for the 32PT, 24PHB, *and 24PTH* DSCs) and -40°F with no solar incidence for storage of the DSC inside the HSM. The 117°F extreme ambient temperature corresponds to a 24 hour calculated average temperature of 102°F.

3. The horizontal and vertical seismic acceleration levels of 0.25g and 0.17g, respectively.

4. The analyzed flood condition of 15 fps water velocity and a height of 50 feet of water (full submergence of the loaded HSM DSC).

5. The potential for fire and explosion should be addressed, based on site-specific considerations.

6. The HSM foundation design criteria are not included in the FSAR. Therefore, the nominal FSAR design or an alternative should be verified for individual sites in accordance with 10 CFR 72.212(b)(2)(ii). Also, in accordance with 10 CFR 72.212(b)(3), the foundation design should be evaluated against actual site parameters to determine whether its failure would cause the standardized NUHOMS® system to exceed the design basis accident conditions.

7. The potential for lightning damage to any electrical system associated with the standardized NUHOMS® system (e.g., thermal performance monitoring) should be addressed, based on site-specific considerations.

8. Any other site parameters or consideration that could decrease the effectiveness of cask systems important to safety.

In accordance with 10 CFR 72.212(b)(2), a record of the written evaluations must be retained by the licensee until spent fuel is no longer stored under the general license issued under 10 CFR 72.210.

1.1.2 Operating Procedures

Written operating procedures shall be prepared for cask handling, loading, movement, surveillance, and maintenance. The operating procedures suggested generically in the FSAR should provide the basis for the user's written operating procedure. The following additional procedure requested by NRC staff should be part of the user operating procedures:

> If fuel needs to be removed from the DSC, either at the end of service life or for inspection after an accident, precautions must be taken against the potential for the presence of damaged or oxidized fuel and to prevent radiological exposure to personnel during this operation. This can be achieved with this design by the use of the purge and fill valves which permit a determination of the atmosphere within the DSC before the removal of the inner top cover plate and shield plugs, prior to filling the DSC cavity with water (borated water for the 24P or 32PT or 24PHB *or 24PTH*). If the atmosphere within the DSC is helium, then operations should proceed normally with fuel removal either via the transfer cask or in the pool. However, if air is present within the DSC, then appropriate filters should be in place to preclude the uncontrolled release of any potential airborne radioactive particulate from the DSC via the purge-fill valves. This will protect both personnel and the operations area from potential contamination. For the accident case, personnel protection in the form of respirators or supplied air should be considered in accordance with the licensee's Radiation Protection Program.

1.1.3 Quality Assurance

Activities at the ISFSI shall be conducted in accordance with a Commission-approved quality assurance program which satisfies the applicable requirements of 10 CFR Part 50, Appendix B, and which is established, maintained, and executed with regard to the ISFSI.

1.1.4 Heavy Loads Requirements

Lifts of the DSC in the TC must be made within the existing heavy loads requirements and procedures of the licensed nuclear power plant. The TC design has been reviewed under 10 CFR Part 72 and found to meet NUREG-0612 and ANSI N14.6. However, an additional safety review (under 10 CFR 50.59) is required to show operational compliance with NUREG-0612 and/or existing plant-specific heavy loads requirements.

1.1.5 Training Module

A training module shall be developed for the existing licensee's training program establishing an ISFSI training and certification program. This module shall include the following:

1. Standardized NUHOMS® Design (overview);
2. ISFSI Facility Design (overview);
3. Certificate of Compliance conditions (overview);
4. Fuel Loading, Transfer Cask Handling, DSC Transfer Procedures; and
5. Off-Normal Event Procedures.

1.1.6 Pre-Operational Testing and Training Exercise

A dry run of the DSC loading, TC handling and DSC insertion into the HSM shall be held. This dry run shall include, but not be limited to, the following:

1. Functional testing of the TC with lifting yokes to ensure that the TC can be safely transported over the entire route required for fuel loading, washdown pit *(decontamination area)* and trailer loading.

2. DSC loading into the TC to verify fit and TC/DSC annulus seal.

3. Testing of TC on transport trailer and transported to ISFSI along a predetermined route and aligned with an HSM.

4. Testing of transfer trailer alignment and docking equipment. Testing of hydraulic ram to insert a DSC loaded with test weights into an HSM and then retrieve it.

5. Loading a mock-up fuel assembly into the DSC.

6. DSC sealing, vacuum drying, and cover gas backfilling operations (using a mock-up DSC).

7. Opening a DSC (using a mock-up DSC).

8. Returning the DSC and TC to the spent fuel pool.

1.1.7 Special Requirements for First System in Place

The heat transfer characteristics of the cask system will be recorded by temperature measurements of the first DSC placed in service. The first DSC shall be loaded with assemblies, constituting a source of approximately 24 kW *in HSM (approximately 40.8 kW in HSM-H)*. The DSC shall be loaded into the HSM, and the thermal performance will be assessed by measuring the air inlet and outlet temperatures for normal airflow. Details for obtaining the measurements are provided in Section 1.2.8, under "Surveillance."

A letter report summarizing the results of the measurements shall be submitted to the NRC for evaluation and assessment of the heat removal characteristics of the cask in place within 30 days of placing the DSC in service, in accordance with 10 CFR 72.4.

Should the first user of the system not have fuel capable of producing a 24 kW heat load *(40.8 kW heat load for 24PTH DSC)*, or be limited to a lesser heat load, as in the case of BWR fuel, the user may use a lesser load for the process, provided that a calculation of the temperature difference between the inlet and outlet temperatures is performed, using the same methodology and inputs documented in the FSAR, with lesser load as the only exception. The calculation and the measured temperature data shall be reported to the NRC in accordance with 10 CFR 72.4. The calculation and comparison need not be reported to the NRC for DSCs that are subsequently loaded with lesser loads than the initial case. However, for the first or any other user, the process needs to be performed and reported for any higher heat sources, up to 24 kW for PWR fuel stored in the 24P or 32PT or 24PHB or 24PTH-S-LC; *up to 40.8 kW for PWR fuel stored in the 24PTH-S or 24PTH-L;* 19 kW for BWR fuel stored in the 52B and 18.3 kW for BWR fuel stored in the 61BT, which are the maximum allowed under the Certificate of Compliance for these specific DSCs. The NRC will also accept the use of artificial thermal loads other than spent fuel, to satisfy the above requirement.

1.1.8 Surveillance Requirements Applicability

The specified frequency for each Surveillance Requirement is met if the surveillance is performed within 1.25 times the interval specified in the frequency, as measured from the previous performance.

For frequencies specified as "once," the above interval extension does not apply.

If a required action requires performance of a surveillance or its completion time requires period performance of "once per...," the above frequency extension applies to the repetitive portion, but not to the initial portion of the completion time.

Exceptions to these requirements are stated in the individual specifications.

1.1.9 Supplemental Shielding

Supplemental shielding and engineered features (e.g., earthen berms, shield walls) that are used to ensure compliance with 10 CFR 72.104(a) by each general licensee are to be considered important to safety and must be appropriately evaluated under 10 CFR 72.212(b).

1.1.10 *HSM-H Storage Configuration*

A minimum of two (2) HSM-Hs are required to be placed adjacent to each other for stability during design basis flood loads.

1.2 Technical Specifications, Functional and Operating Limits

1.2.1 Fuel Specifications

Limit/Specification:	The characteristics of the spent fuel which is allowed to be stored in the standardized NUHOMS® system are limited by those included in Tables 1-1a, 1-1b, 1-1c, 1-1d, 1-1e, 1-1f, 1-1g, 1-1i, 1-1j, *1-1l, and 1-1m.*
Applicability:	The specification is applicable to all fuel to be stored in the standardized NUHOMS® system.
Objective:	The specification is prepared to ensure that the peak fuel rod cladding temperatures, maximum surface doses, and nuclear criticality effective neutron multiplication factor are below the design limits. Furthermore, the fuel weight and type ensures that structural conditions in the FSAR bound those of the actual fuel being stored.
Action:	Each spent fuel assembly to be loaded into a DSC shall have the parameters listed in Tables 1-1a, 1-1b, 1-1c, 1-1d, 1-1e, 1-1f, 1-1g, 1-1i, 1-1j, *1-1l, and 1-1m* verified and documented. Fuel not meeting this specification shall not be stored in the standardized NUHOMS® system.
Surveillance:	*Prior to loading* of a spent fuel assembly into a DSC, the identity of each fuel assembly shall be independently verified and documented.
Bases:	The specification is based on consideration of the design basis parameters included in the FSAR and limitations imposed as a result of the staff review. Such parameters stem from the type of fuel analyzed, structural limitations, criteria for criticality safety, criteria for heat removal, and criteria for radiological protection. The standardized NUHOMS® system is designed for dry, horizontal storage of irradiated light water reactor (LWR) fuel. The principal design parameters of the fuel to be stored can accommodate standard PWR fuel designs manufactured by Babcock and Wilcox (B&W), Combustion Engineering (CE), and Westinghouse (WE), and standard BWR fuel manufactured by General Electric (GE) and Exxon/ANF. The NUHOMS®-24P and 52B systems are limited for use to these standard designs and to equivalent designs by other manufacturers as listed in Chapter 3 of the FSAR. The analyses presented in the FSAR are based on non-consolidated, zircaloy-clad fuel with no known or suspected gross breaches.

The NUHOMS®-61BT, 32PT, 24PHB, *and 24PTH* systems are limited for use to these standard designs and to equivalent designs by other manufacturers as listed in Tables 1-1d, 1-1f, 1-1i, 1-1j, *and 1-1m.* The corresponding analyses for these systems *are* presented in Appendix K, M, N *and P* respectively of the FSAR.

The physical parameters that define the mechanical and structural design of the HSM and DSC are the fuel assembly dimensions and weight. The calculated stresses given in the FSAR are based on the physical parameters given in Tables 1-1a, 1-1b, 1-1c, 1-1d, 1-1e, 1-1f, 1-1g, 1-1i, 1-1j, *1-1l, and 1-1m* which represent the upper bound.

The design basis fuel assemblies for nuclear criticality safety are Babcock and Wilcox 15x15 fuel assemblies for the NUHOMS®-24P and 24PHB, General Electric 7x7 fuel assemblies for the NUHOMS®-52B and General Electric 10x10 fuel assemblies for the NUHOMS®-61BT designs. The nuclear criticality safety for the NUHOMS®-32PT *and* NUHOMS®-*24PTH* designs is based on an evaluation of individual fuel assembly class as listed in Table 1-1e *and Table 1-1l respectively.*

The NUHOMS®-24P Long Cavity DSC is designed for use with standard Burnable Poison Rod Assembly (BPRA) designs for the B&W 15x15 and Westinghouse 17x17 fuel types as listed in Appendix J of the FSAR. The NUHOMS®-24PHB Long Cavity DSC is designed for use with standard BPRA designs for the B&W 15x15 fuel types listed in Appendix N of the FSAR.

The design basis PWR BPRA for shielding source terms and thermal decay heat load is the Westinghouse 17x17 Pyrex Burnable Absorber, while the DSC internal pressure analysis is limited by B&W 15x15 BPRAs. In addition, BPRAs with cladding failures were determined to be acceptable for loading into NUHOMS®-24P Long Cavity DSC as evaluated in Appendix J of the FSAR. The acceptability of loading BPRAs, including damaged BPRAs into the long cavity versions of the 32PT and 24PTH DSC configurations is provided in Appendix M and Appendix P respectively of the FSAR.

Control Components (CCs), as listed in Table 1-1l are authorized for storage in the NUHOMS®-24PTH DSC. The acceptability of loading CCs is provided in Appendix P of the FSAR.

The NUHOMS®-24P is designed for unirradiated fuel with an initial fuel enrichment of up to 4.0 wt. % U-235, taking credit for soluble boron in the DSC cavity water during loading operations. Section 1.2.15 defines the requirements for boron concentration in the DSC cavity water for the NUHOMS®-24P design only. In addition, the fuel assemblies qualified for storage in NUHOMS®-24P DSC have an equivalent unirradiated enrichment of less than or equal to 1.45 wt. % U-235. Figure 1-1 defines the required burnup as a function of initial enrichment. The NUHOMS®-52B is designed for unirradiated fuel with an initial enrichment of less than or equal to 4.0 wt. % U-235.

The NUHOMS®-61BT has three basket configurations, based on the boron content in the poison plates as listed in Table 1-1k. The maximum lattice average enrichment authorized for Type A, B and C NUHOMS®-61BT DSC is 3.7, 4.1 and 4.4 wt. % U-235 respectively.

The NUHOMS®-32PT is designed for unirradiated fuel with an initial fuel enrichment of up to 5.0 wt. % U-235 as shown in Table 1-1g, taking credit for Poison Rod Assemblies (PRAs), poison plates, and soluble boron in the DSC cavity water during loading operations. The required number of PRAs as a function of assembly class and maximum initial enrichment is per Table 1-1g. The required PRA locations are per Figures 1-5, or 1-6 or 1-7. Table 1-1h specifies the minimum B10 content for poison plates. Specification 1.2.15a defines the requirements for boron concentration in the DSC cavity water for the NUHOMS®-32PT design only.

The NUHOMS®-24PHB is designed for unirradiated fuel with an *assembly average* initial enrichment of less than or equal to 4.5 wt. % U-235 as shown in Table 1-1i, taking credit for soluble boron in the DSC cavity water during loading operations. Specification 1.2.15b defines the requirements for boron concentration in the DSC cavity water for the NUHOMS®-24PHB design only.

The NUHOMS®*-24PTH is designed for unirradiated fuel with an assembly average initial enrichment of less than or equal to 5.0 wt. % U-235, as shown in Table 1-1l, taking credit for soluble boron in the DSC cavity water during loading operations and the boron content in the poison plates of the DSC basket, as shown in Table 1-1p for intact fuel and Table 1-1q for damaged fuel. The 24PTH DSC basket is designated as Type 1, if it is provided with aluminum inserts and Type 2 if it does not contain the aluminum inserts. Each basket type is designed with three alternate configurations, based on the boron content in the poison plates, as listed in Table 1-1r. Specification 1.2.15c defines the requirements for boron concentration in the DSC cavity water as a function of the DSC basket type for the various fuel classes authorized for storage in the 24PTH DSC for the* NUHOMS®*-24PTH design only.*

The thermal design criterion of the fuel to be stored is that the total maximum heat generation rate per assembly and BPRA *or Control Components* be such that the fuel cladding temperature is maintained within established limits during normal and off-normal conditions. For the NUHOMS®-24P, 52B and 61BT systems, fuel cladding temperature limits were established based on methodology in PNL-6189 and PNL-4835. For the NUHOMS®-32PT, 24PHB *and 24PTH* systems, fuel cladding limits are based on ISG-11, Rev. 2 (Reference 3).

The radiological design criterion is that fuel stored in the NUHOMS® system must not increase the average calculated HSM or transfer cask surface dose rates beyond those calculated for the 24P, 24PHB, 52B, 61BT, or 32PT canister full of design basis fuel assemblies with or without BPRAs. The design value average HSM and cask surface dose rates for the 24P and 52B canisters were calculated to be 48.6 mrem/hr and 591.8 mrem/hr respectively based on storing twenty four (24) Babcock and Wilcox 15x15 PWR assemblies (without BPRAs) with 4.0

wt. % U-235 initial enrichment, irradiated to 40,000 MWd/MTU, and having a post irradiation time of five years. To account for BPRAs, the fuel assembly cooling required times are increased to maintain the above dose rate limits.

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

Title or Parameter	Specifications
Fuel	Only intact, unconsolidated PWR fuel assemblies (with or without BPRAs) with the following requirements.
Physical Parameters (without BPRAs)	
Maximum Assembly Length (unirradiated)	165.75 in (standard cavity) 171.71 in (long cavity)
Nominal Cross-Sectional Envelope	8.536 in
Maximum Assembly Weight	1682 lbs
No. of Assemblies per DSC	≤ 24 intact assemblies
Fuel Cladding	Zircalloy-clad fuel with no known or suspected gross cladding breaches
Physical Parameters (with BPRAs)	
Maximum Assembly + BPRA Length (unirradiated)	
With Burnup > 32,000 and ≤ 45,000 MWd/MTU	171.71 in (long cavity)
With Burnup ≤ 32,000 MWd/MTU	171.96 in (long cavity)
Nominal Cross-Sectional Envelope	8.536 in
Maximum Assembly + BPRA Weight	1682 lbs
No. of Assemblies per DSC	≤ 24 intact assemblies
No. of BPRAs per DSC	≤ 24 BPRAs
Fuel Cladding	Zircalloy-clad fuel with no known or suspected gross cladding breaches
Nuclear Parameters	
Fuel Initial Enrichment	≤ 4.0 wt. % U-235
Fuel Burnup and Cooling Time	Per Table 1-2a (without BPRAs) or Per Table 1-2c (with BPRAs)
BPRA Cooling Time (Minimum)	5 years for B&W Designs 10 years for Westinghouse Designs
Alternate Nuclear Parameters	
Initial Enrichment	≤ 4.0 wt. % U-235
Burnup	≤ 40,000 MWd/MTU
Decay Heat (Fuel + BPRA)	≤ 1.0 kW per assembly
Neutron Fuel Source	≤ 2.23×10^{8} n/sec per assy with spectrum bounded by that in Chapter 7 of FSAR
Gamma (Fuel + BPRA) Source	≤ 7.45×10^{15} g/sec per assy with spectrum bounded by that in Chapter 7 of FSAR

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

Title or Parameter	Specifications
Fuel	Only intact, unconsolidated BWR fuel assemblies with the following requirements
Physical Parameters	
Maximum Assembly Length (unirradiated)	176.16 in
Nominal Cross-Sectional Envelope*	5.454 in
Maximum Assembly Weight	725 lbs
No. of Assemblies per DSC	≤ 52 intact channeled assemblies
Fuel Cladding	Zircalloy-clad fuel with no known or suspected gross cladding breaches
Nuclear Parameters	
Fuel Initial Lattice Enrichment	≤ 4.0 wt. % U-235
Fuel Burnup and Cooling Time	Per Table 1-2b
Alternate Nuclear Parameters	
Initial Enrichment	≤ 4.0 wt. % U-235
Burnup	≤ 35,000 MWd/MTU and per Figure 1.1
Decay Heat	≤ 0.37 kW per assembly
Neutron Source	≤ 1.01×10^{8} n/sec per assy with spectrum bounded by that in Chapter 7 of FSAR
Gamma Source	≤ 2.63×10^{15} g/sec per assy with spectrum bounded by that in Chapter 7 of FSAR

*Cross-Sectional Envelope is the outside dimension of the fuel channel.

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 manufactured by General Electric or equivalent reload fuel that are enveloped by the fuel assembly design characteristics listed in Table 1-1d.
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 Length	176.2 in
Nominal Assembly Width (excluding channels)	5.44 in
Maximum Assembly Weight	705 lbs
Radiological Parameters: No interpolation of Radiological Parameters is permitted between Groups.	
Group 1	
Maximum Burnup	27,000 MWd/MTU
Minimum Cooling Time	5-years
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Bundle Average Enrichment	2.0 wt. % U-235
Maximum Initial Uranium Content	198 kg/assembly
Maximum Decay Heat	300 W/assembly
Group 2	
Maximum Burnup	35,000 MWd/MTU
Minimum Cooling Time	8-years
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Bundle Average Enrichment	2.65 wt. % U-235
Maximum Initial Uranium Content	198 kg/assembly
Maximum Decay Heat	300 W/assembly
Group 3	
Maximum Burnup	37,200 MWd/MTU
Minimum Cooling Time	6.5-years
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Bundle Average Enrichment	3.38 wt. % U-235
Maximum Initial Uranium Content	198 kg/assembly
Maximum Decay Heat	300 W/assembly
Group 4	
Maximum Burnup	40,000 MWd/MTU
Minimum Cooling Time	10-years
Maximum Lattice Average Initial Enrichment	See Minimum Boron Loading below.
Minimum Initial Bundle Average Enrichment	3.4 wt. % U-235
Maximum Initial Uranium Content	198 kg/assembly
Maximum Decay Heat	300 W/assembly
Minimum Boron Loading	
Lattice Average Enrichment (wt. % U-235)	Minimum B-10 Content in Poison Plates
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
Fuel Burnup, Initial Bundle Average Enrichment, and Cooling Time:	See Table 1-2q
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	300 W/assembly

Table 1-1d
BWR Fuel Assembly Design Characteristics [1][2][3]
for the NUHOMS®-61BT DSC

Transnuclear, ID	7 x 7-49/0[5]	8 x 8-63/1[5]	8 x 8-62/2[5]	8 x 8 - 60/4[5]	8 x 8-60/1[5]	9 x 9-74/2	10x10-92/2	7x7-49/0[5]	7x7 48/1Z[5]	8x8 – 60/4Z[5]
GE Designations	GE1 GE2 GE3	GE4	GE-5 GE-Pres GE-Barrier GE8 Type I	GE8 Type II	GE9 GE10	GE11 GE13	GE12	ENC III-A	ENC III[3]	ENC Va & ENC Vb
Max Length (in) (Unirradiated)	176.2	176.2	176.2	176.2	176.2	176.2	176.2	176.2	176.2	176.2
Nominal Width (in) (excluding channels)	5.44	5.44	5.44	5.44	5.44	5.44	5.44	5.44	5.44	5.44
Fissile Material	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Number of Fuel Rods	49	63	62	60	60	66 – Full 8 – Partial	78 – Full 14 - Partial	49	48	60
Number of Water Holes	0	1	2	4	1	2	2	0	1[4]	4[4]

(1) Any fuel channel thickness from 0.065 to 0.120 inch is acceptable on any of the fuel designs.
(2) Maximum fuel assembly weight with channel is 705 lb.
(3) Includes ENC III-E and ENC III-F.
(4) Solid Zirc rods instead of water holes.
(5) May be stored as damaged fuel.

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

<u>PHYSICAL PARAMETERS:</u>	
Fuel Assembly Class	B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14 and WE 14x14 assemblies that are enveloped by the fuel assembly design characteristics listed in Table 1-1f.
Fuel Cladding Material	Zircaloy
Fuel Damage	Cladding damage in excess of pinhole leaks or hairline cracks is not authorized to be stored as "Intact PWR Fuel."
Burnable Poison Rod Assemblies (BPRAs)	Standard BPRA designs for the B&W 15x15 and Westinghouse 17x17 class assemblies as listed in Appendix J of the FSAR.
Maximum Assembly plus BPRA Weight	-1365 lbs for 32PT-S100 & 32PT-L100 System -1682 lbs for 32PT-S125 & 32PT-L125 System
BPRA Damage	BPRAs with cladding failures are acceptable for loading.
<u>THERMAL/RADIOLOGICAL PARAMETERS:</u>	
Fuel Burnup and Cooling Time without BPRAs	Per Table 1-2d, Table 1-2e, Table 1-2f, Table 1-2g, Table 1-2h, and Figure 1-2 or Figure 1-3 or Figure 1-4.
Fuel Burnup and Cooling Time with BPRAs	Per Table 1-2i, Table 1-2j, Table 1-2k, Table 1-2l, Table 1-2m and Figure 1-2 or Figure 1-3 or Figure 1-4.
Initial Enrichment	Per Table 1-1g and Figure 1-5 or Figure 1-6 or Figure 1-7.
B&W 15x15 BPRA Burnup and Cooling Time	BPRA Burnup shall not exceed that of a BPRA irradiated in fuel assemblies with a total Burnup of 36,000 MWd/MTU. -Minimum Cooling Time 5 years
WE 17x17 BPRA Burnup and Cooling Time	BPRA Burnup shall not exceed that of a BPRA irradiated in fuel assemblies with a total Burnup of 36,000 MWd/MTU. -Minimum Cooling Time 10 years

Table 1-1f
PWR Fuel Assembly Design Characteristics for the NUHOMS®-32PT DSC

Assembly Class	B&W 15x15	WE 17x17	CE 15x15	WE 15x15	CE 14x14	WE 14x14
DSC Configuration	**Max Unirradiated Length (in)**					
32PT-S100/32PT-S125	165.75	165.75	165.75	165.75	165.75	165.75
32PT-L100/32PT-L125	171.71[(1)]	171.71[(1)]	171.71	171.71	171.71	171.71
Fissile Material	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Maximum MTU/assembly[(2)]	0.475	0.475	0.475	0.475	0.475	0.475
Maximum Number of Fuel Rods	208	264	216	204	176	179
Maximum Number of Guide/ Instrument Tubes	17	25	9	21	5	17

(1) Maximum Assembly + BPRA Length (unirradiated)
(2) The maximum MTU/assembly is based on the shielding analysis. The listed value is higher than the actual.

Table 1-1g
Initial Enrichment and Required Number of PRAs (NUHOMS®-32PT DSC)

Assembly Class	Assembly Type	Initial Enrichment, wt. % U-235			
		0 PRAs	4 PRAs	8 PRAs	16 PRAs
WE 17x17(1)	Westinghouse 17x17 LOPAR/Std Westinghouse 17x17 OFA/Vantage 5	3.40	4.00	4.50	5.00
B&W 15x15(1)	B&W 15x15 Mark B	3.30	3.90	NA	5.00
CE 15x15	CE 15x15 Palisades Exxon/ANF 15x15 CE	3.40	Not Evaluated	Not Evaluated	Not Evaluated
WE 15x15	Westinghouse 15x15 Std/ZC Exxon/ANF 15x15 WE	3.40	4.00	4.60	5.00
CE 14x14	CE 14x14 Std/Generic CE 14x14 Fort Calhoun	3.80	4.60	5.00	Not Evaluated
WE 14x14	Westinghouse 14x14 ZCA/ZCB Westinghouse 14x14 OFA Exxon/ANF 14x14 WE	4.00	5.00	Not Evaluated	Not Evaluated

(1) With or without BPRAs. BPRAs shall not be stored in basket locations where a PRA is required.

Table 1-1h
B10 Content Specification for Poison Plates (NUHOMS®-32PT DSC)

DSC Configuration	Poison Plate Specification
32PT-S100 or 32PT-S125 or 32PT-L100 or 32PT-L125	Minimum B10 areal density = 0.007 gm/cm^2

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

Title or Parameter	Specifications
Fuel	Only intact, unconsolidated B&W 15x15 class PWR fuel assemblies (with or without BPRAs) with the following requirements
Maximum No. of Reconstituted Assemblies per DSC with Stainless Steel rods	4
Maximum No. of Stainless Steel Rods per Reconstituted Assembly	10
Maximum No. of Reconstituted Assemblies per DSC with low enriched uranium oxide rods	24
Physical Parameters (without BPRAs)	
Maximum Assembly Length (unirradiated)	165.785 in (standard cavity) 171.96 in (long cavity)
Nominal Cross-Sectional Envelope	8.536 in
Maximum Assembly Weight	1682 lbs
No. 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 Length (unirradiated)	171.96 in (long cavity)
Nominal Cross-Sectional Envelope	8.536 in
Maximum Assembly + BPRA Weight	1682 lbs
No. of Assemblies per DSC	≤ 24 intact assemblies
No. of BPRAs per DSC	≤ 24 BPRAs
Fuel Cladding	Zircaloy-clad fuel with no known or suspected gross cladding breaches
Nuclear Parameters	
Maximum Fuel Initial Enrichment	4.5 wt. % U-235
Maximum Initial Uranium loading per assembly	0.490 MTU
Allowable loading configurations for each 24PHB DSC	As specified in Figure 1-8 or 1-9
Burnup, Enrichment, and Minimum Cooling Time for Configuration 1 (Figure 1-8)	Table 1-2n for Zone 1 fuel; Table 1-2o for Zone 2 fuel; Table 1-2p for Zone 3 fuel
Burnup, Enrichment, and Minimum Cooling Time for Configuration 2 (Figure 1-9)	Table 1-2p for Zone 3 fuel
Minimum Cooling Time for BPRAs	5 years
Total Decay Heat per DSC	24 kW
Decay Heat Limits for Zone 1, 2 and 3 fuel	As specified in Figures 1-8 and 1-9.

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 manufactured by General Electric or Exxon/ANF or equivalent reload fuel that are enveloped by the Fuel assembly design characteristics listed in Table 1-1d for the 7x7 and 8x8 designs only.
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. 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 and retrievability is assured following Normal/Off-Normal conditions. Damaged fuel shall be stored with Top and Bottom Caps for Failed Fuel. Damaged fuel may only be stored in the 2x2 compartments of the "Type C" NUHOMS®-61BT Canister.
Channels:	Fuel may be stored with or without fuel channels.
Maximum Assembly Length (unirradiated)	176.2 in
Nominal Assembly Width (excluding channels)	5.44 in
Maximum Assembly Weight	705 lbs
RADIOLOGICAL PARAMETERS:	No interpolation of Radiological Parameters is permitted between groups.
Group 1: Maximum Burnup:	27,000 MWd/MTU
Minimum Cooling Time:	5-years
Maximum Initial Lattice Average Enrichment:	4.0 wt. % U-235
Maximum Pellet Enrichment:	4.4 wt. % U-235
Minimum Initial Bundle Average Enrichment:	2.0 wt. % U-235
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	300 W/assembly
Group 2: Maximum Burnup:	35,000 MWd/MTU
Minimum Cooling Time:	8-years
Maximum Initial Lattice Average Enrichment:	4.0 wt. % U-235
Maximum Pellet Enrichment:	4.4 wt. % U-235
Minimum Initial Bundle Average Enrichment:	2.65 wt. % U-235
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	300 W/assembly
Group 3: Maximum Burnup:	37,200 MWd/MTU
Minimum Cooling Time:	6.5-years
Maximum Initial Lattice Average Enrichment:	4.0 wt. % U-235
Maximum Pellet Enrichment:	4.4 wt. % U-235
Minimum Initial Bundle Average Enrichment:	3.38 wt. % U-235
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	300 W/assembly

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

(Concluded)

RADIOLOGICAL PARAMETERS:	
Group 4:	
Maximum Burnup:	40,000 MWd/MTU
Minimum Cooling Time:	10-years
Maximum Initial Lattice Average Enrichment:	4.0 wt. % U-235
Maximum Pellet Enrichment:	4.4 wt. % U-235
Minimum Initial Bundle Average Enrichment:	3.4 wt. % U-235
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	300 W/assembly
ALTERNATE RADIOLOGICAL PARAMETERS:	
Maximum Initial Lattice Average Enrichment:	4.0 wt. % U-235
Fuel Burnup, Initial Bundle Average Enrichment, and Cooling Time:	See Table 1-2q
Maximum Pellet Enrichment:	4.4 wt. % U-235
Maximum Initial Uranium Content:	198 kg/assembly
Maximum Decay Heat:	300 W/assembly

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

NUHOMS®-61BT DSC Basket Type	Minimum B10 Aerial Density, gm/cm²	
	Enriched Boron Aluminum Alloy or Boralyn®(1)	Boral® or Metamic®(2)
A	.021	.025
B	.032	.038
C	.040	.048

Note 1: An alternate metal matrix composite with properties equivalent to Boralyn® is acceptable.
Note 2: An alternate metal matrix composite with properties equivalent to Metamic® is acceptable.

Table 1-1l

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

PHYSICAL PARAMETERS:	
Fuel Class	*Intact or damaged unconsolidated B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14 and WE 14x14 class PWR assemblies (with or without control components) that are enveloped by the fuel assembly design characteristics listed in Table 1-1m. Equivalent reload fuel manufactured by other vendors but enveloped by the design characteristics listed in Table 1-1m is also acceptable.*
Fuel Damage	*Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods or fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of cladding damage in the fuel rods is to be limited such that a fuel pellet is not able to pass through the damaged cladding opening during handling and retrievability is assured following normal and off-normal conditions.*
Reconstituted Fuel Assemblies:	
• *Maximum No. of Reconstituted Assemblies per DSC With Stainless Steel Rods*	*4*
• *Maximum No. of Stainless Steel Rods per Reconstituted Fuel Assembly*	*10*
• *Maximum No. of Reconstituted Assemblies per DSC with low enriched UO2 rods*	*24*
Control Components (CCs)	• *Up to 24 CCs are authorized for storage in 24PTH-L and 24PTH-S-LC DSCs only.* • *Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Axial Power Shaping Assembly Rods (APSRAs), Orifice Rod Assemblies (ORAs) and Neutron Source Assemblies (NSAs).* • *Design basis thermal and radiological characteristics for the CCs are listed in Table 1-1n.*
Nominal Assembly Width	*8.536 inches*
No. of Intact Assemblies	*≤24*
No. and Location of Damaged Assemblies	*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.* *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.*
Maximum Assembly plus CC Weight	*1682 lbs*

Table 1-1l
PWR Fuel Specification for the Fuel to be Stored in the* NUHOMS®*-24PTH DSC (Concluded)

<u>THERMAL/RADIOLOGICAL PARAMETERS:</u> *Allowable Heat Load Zoning Configurations for each 24PTH DSC*	*Per Figure 1-11 or Figure 1-12 or Figure 1-13 or Figure 1-14 or Figure 1-15.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 1 (Without CCs)	*Per Table 1-3a for Zone 1 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 2 (Without CCs)	*Per Table 1-3b for Zone 2 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 3 (Without CCs)	*Per Table 1-3b for Zone 2 fuel and Table 1-3c for Zone 3 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 4 (Without CCs)	*Per Table 1-3d for Zone 4 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 5 (Without CCs)	*Per Table 1-3c for Zone 3 fuel and Table 1-3d for Zone 4 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 1 (With CCs)	*Per Table 1-3e for Zone 1 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 2 (With CCs)	*Per Table 1-3f for Zone 2 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 3 (With CCs)	*Per Table 1-3f for Zone 2 fuel and per Table 1-3g for Zone 3 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 4 (With CCs)	*Per Table 1-3h for Zone 4 fuel.*
Burnup, Enrichment, and Minimum Cooling Time for Configuration 5 (With CCs)	*Per Table 1-3g for Zone 3 fuel and per Table 1-3h for Zone 4 fuel.*
Maximum Initial Fuel Enrichment	*5.0 wt. % U-235*
Maximum Decay Heat Limits for Zones 1, 2, 3, and 4 Fuel	*Per Figure 1-11 or Figure 1-12 or Figure 1-13 or Figure 1-14 or Figure 1-15.*
Decay Heat per DSC	*≤40.8 kW for 24PTH-S and 24PTH-L DSCs (Type 1 Basket)*
	≤31.2 kW for 24PTH-S and 24PTH-L DSCs (Type 2 Basket)
	≤24.0 kW for 24PTH-S-L DSC (Type 2 Basket)
Minimum Boron Loading in the Poison Plates	*Per Table 1-1r*

Table 1-1m
PWR Fuel Assembly Design Characteristics for the NUHOMS®*-24PTH DSC*

Assembly Class		*B&W 15x15*	*WE 17x17*	*CE 15x15*	*WE 15x15*	*CE 14x14*	*WE 14x14*
Maximum Unirradiated Length (in) (1)	*24PTH-S*	*165.75*	*165.75*	*165.75*	*165.75*	*165.75*	*165.75*
	24PTH-L	*171.93*	*171.93*	*171.93*	*171.93*	*171.93*	*171.93*
	24PTH-S-LC	*171.93*	*N/A*(3)	*N/A*(3)	*N/A*(3)	*N/A*(3)	*N/A*(3)
Fissile Material		UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Maximum MTU/Assembly(2)		*0.49*	*0.49*	*0.49*	*0.49*	*0.49*	*0.49*
Maximum Number of Fuel Rods		*208*	*264*	*216*	*204*	*176*	*179*
Maximum Number of Guide/ Instrument Tubes		*17*	*25*	*9*	*21*	*5*	*17*

(1) Maximum Assembly + Control Component Length (unirradiated)
(2) The maximum MTU/assembly is based on the shielding analysis. The listed value is higher than the actual.
(3) Not authorized for storage.

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

Parameter	***BPRAs, NSAs, CRAs and APSRAs***	***TPAs and ORAs***
Maximum Gamma Source (γ/sec/DSC)	*9.3E+14*	*9.8E+13*
Decay Heat (Watts/DSC)	*192.0*	*192.0*

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

Fuel Assembly Class	Maximum Assembly 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		
		1A or 2A	1B or 2B	1C or 2C
CE 14x14 (1)	2100	4.50	4.90	NR
	2200	4.60	5.00	NR
	2300	4.70	NR	NR
	2400	4.80	NR	NR
	2500	4.90	NR	NR
	2600	5.00	NR	NR
WE 14x14 (2)	2100	4.80	5.00	NR
	2200	4.90	NR	NR
	2300	5.00	NR	NR
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	NR
	2700	4.50	4.90	NR
	2800	4.50	5.00	NR
	2900	4.60	NR	NR
	3000	4.70	NR	NR
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	NR
	2700	4.30	4.80	NR
	2800	4.40	4.90	NR
	2900	4.50	5.00	NR
	3000	4.60	NR	NR

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

(Concluded)

Fuel Assembly Class	Maximum Assembly 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		
		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	NR
	2800	4.40	4.80	NR
	2900	4.50	4.90	NR
	3000	4.60	5.00	NR
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	NR
	2900	4.30	4.80	NR
	3000	4.40	4.90	NR

Notes:

(1) *When CCs that extend into the active fuel region are stored, the maximum assembly average initial enrichment shall be reduced by 0.2 wt. %.*
(2) *When CCs that extend into the active fuel region are stored, the maximum assembly average initial enrichment shall be reduced by 0.05 wt. % or the soluble boron concentration shall increased by 50 ppm.*

Note: NR = Not Required.

Table 1-1q
Maximum Assembly 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 Assembly 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		
			1A or 2A	1B or 2B	1C or 2C
CE 14x14 (1)	8	2150	NR	4.80	NR
	12	2150	NR	4.70	NR
	12	2450	4.50	5.00	NR
WE 14x14 (2)	12	2150	4.50	5.00	NR
CE 15x15 (2)	12	2150	NR	NR	4.50
	12	2550	NR	NR	5.00
WE 15x15 (2)	8	2150	NR	NR	4.50
	12	2250	NR	NR	4.50
	8	2550	NR	NR	5.00
	12	2650	NR	NR	5.00
B&W 15x15 (2)	12	2350	NR	NR	4.50
	12	2800	NR	NR	5.00
WE 17x17 (2)	12	2250	NR	NR	4.50
	12	2650	NR	NR	5.00

Notes:

(1) *When CCs that extend into the active fuel region are stored, the maximum assembly average initial enrichment shall be reduced by 0.2 wt. %.*

(2) *When CCs that extend into the active fuel region are stored, the maximum assembly average initial enrichment shall be reduced by 0.05 wt. % or the soluble boron concentration shall increased by 50 ppm.*

Note: NR = Not Required.

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

NUHOMS®-*24PTH DSC Basket Type*[1]	*Minimum B10 Aerial Density, gm/cm²*	
	Natural or Enriched Boron Aluminum Alloy / Metal Matric Composite (MMC)	*Boral®*
1A or 2A	*.007*	*.009*
1B or 2B	*.015*	*.019*
1C or 2C	*.032*	*.040*

(1) Basket Type 1 contains aluminum inserts in the R45 transition rails of the basket, Type 2 does not contain aluminum inserts.

Table 1-2a
PWR Fuel Qualification Table for the Standardized NUHOMS®-24P DSC (Fuel Without BPRAs)

(Minimum required years of cooling time after reactor core discharge)

Burnup (GWd/ MTU)	Initial Enrichment (wt. % U-235)																				
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
10	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
15	5	5	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
20	5	5	5	5	5	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
25		5	5	5	5	5	5	5	5	a	a	a	a	a	a	a	a	a	a	a	a
28				5	5	5	5	5	5	5	5	5	a	a	a	a	a	a	a	a	a
30						5	5	5	5	5	5	5	5	a	a	a	a	a	a	a	a
32							5	5	5	5	5	5	5	5	5	a	a	a	a	a	a
34								6	5	5	5	5	5	5	5	5	5	a	a	a	a
36									6	6	6	6	5	5	5	5	5	5	5	a	a
38											7	6	6	6	6	6	6	6	5	5	5
40					Not Acceptable							8	8	8	7	6	6	6	6	6	6
41					or							9	9	9	8	8	8	8	8	8	8
42					Not Analyzed								10	9	9	9	9	9	9	8	8
43													10	10	10	10	10	9	9	9	9
44														11	11	11	11	10	10	10	10
45														12	12	11	11	11	11	11	11

a) Minimum Cooling Time 5 years, and Minimum 2350 ppm soluble boron required in the DSC cavity water during loading or unloading.

Notes:

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 wt. % U-235 must be qualified for storage using the alternate nuclear parameters specified in Table 1-1a. Fuel with an initial enrichment greater than 4.0 wt. % U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage.
- Example: An assembly with an initial enrichment of 3.65 wt. % U-235 and a burnup of 42.5 GWd/MTU is acceptable for storage after a ten-year cooling time as defined at the intersection of 3.6 wt. % U-235 (rounding down) and 43 GWd/MTU (rounding up) on the qualification table.

Table 1-2b
BWR Fuel Qualification Table for the Standardized NUHOMS®-52B DSC
(Minimum required years of cooling time after reactor core discharge)

Burnup (GWd/ MTU)	Initial Enrichment (wt. % U-235)																				
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
15	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
32					6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5
34						8	8	8	8	8	8	8	8	7	6	6	6	6	6	6	6
35							10	10	10	10	9	8	8	8	8	8	8	8	6	6	6
36							11	11	11	11	11	10	10	10	10	10	10	9	8	8	8
37								13	13	12	12	12	12	11	11	11	11	11	10	10	10
38								15	14	14	14	13	13	13	13	12	12	12	12	12	11
39				Not Acceptable				18	17	17	16	16	16	15	14	14	14	14	13	13	13
40				or					21	21	20	20	19	18	17	17	16	16	16	16	15
42				Not Analyzed						22	22	22	21	21	20	20	20	19	18	17	17
44										24	24	23	23	23	22	22	21	21	21	20	20
45											25	24	24	23	23	23	22	22	22	21	21

Notes:

- Use burnup and enrichment to lookup required cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 wt. % U-235 must be qualified for storage using the alternate nuclear parameters specified in Table 1-1b. Fuel with an initial enrichment greater than 4.0 wt. % U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage. Fuel with a burnup less than 15 GWd/MTU is acceptable after three years cooling time provided the physical parameters from Table 1-1b have been met.
- Example: An assembly with an initial enrichment of 3.05 wt. % U-235 and a burnup of 34.5 GWd/MTU is acceptable for storage after a nine-year cooling time as defined at the intersection of 3.0 wt. % U-235 (rounding down) and 35 GWd/MTU (rounding up) on the qualification table.

Table 1-2c
PWR Fuel Qualification Table for the Standardized NUHOMS®-24P DSC (Fuel With BPRAs)

(Minimum required years of cooling time after reactor core discharge)

Burnup (GWd/ MTU)	Initial Enrichment (wt. % U-235)																				
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
10	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
15	5	5	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
20	5	5	5	5	5	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
25		5	5	5	5	5	5	5	5	a	a	a	a	a	a	a	a	a	a	a	a
28				5	5	5	5	5	5	5	5	5	a	a	a	a	a	a	a	a	a
30						6	6	6	5	5	5	5	5	a	a	a	a	a	a	a	a
32							6	6	6	6	6	6	5	5	5	a	a	a	a	a	a
34								7	6	6	6	6	6	6	6	6	6	a	a	a	a
36									8	7	7	7	6	6	6	6	6	6	6	a	a
38											8	8	7	7	7	7	6	6	6	6	6
40					Not Acceptable							9	9	8	8	8	7	7	7	7	6
41					or							10	9	9	9	9	8	8	8	8	8
42					Not Analyzed								10	10	9	9	9	9	9	9	9
43													11	11	11	10	10	10	10	9	9
44														12	11	11	11	11	10	10	10
45														13	12	12	12	11	11	11	11

a) Minimum Cooling Time 5 years, and Minimum 2350 ppm soluble boron required in the DSC cavity water during loading or unloading.

Notes:

- BPRA Burnup shall not exceed that of a BPRA irradiated in fuel assemblies with a total burnup of 36,000 MWd/MTU.
- Minimum cooling time for a BPRA is 5 years for B&W designs and 10 years for Westinghouse designs, regardless of the required assembly cooling time.
- Use burnup and enrichment to lookup minimum fuel assembly cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 wt. % U-235 must be qualified for storage using the alternate nuclear parameters specified in Table 1-1a. Fuel with an initial enrichment greater than 4.0 wt. % U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage.
- Example: An assembly with an initial enrichment of 3.65 wt. % U-235 and a burnup of 42.5 GWd/MTU is acceptable for storage after a ten-year cooling time as defined at the intersection of 3.6 wt. % U-235 (rounding down) and 43 GWd/MTU (rounding up) on the qualification table.

Table 1-2d
PWR Fuel Qualification Table for 1.2 kW per Assembly Fuel Without BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/ MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30						5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
32							5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
34								5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
36									5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
38											5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
39											5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
40			Not Analyzed									5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
41												5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
42												6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5
43													6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5
44														6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
45														6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a six-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2e

PWR Fuel Qualification Table for 0.87 kW per Assembly Fuel Without BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/ MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30						5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
32							6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
34								6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5
36									6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
38											7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6
39											7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
40				Not Analyzed								8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
41												8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7
42												8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
43													9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8
44														9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	8
45														10	10	10	10	10	10	9	9	9	9	9	9	9	9	9	9	9	9

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a eight-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2f
PWR Fuel Qualification Table for 0.7 kW Fuel Without BPRAs per Assembly for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU	Initial Enrichment wt % U-235																													
(GWd/ MTU)	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5
30						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
32							7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6
34								8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
36									9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
38											10	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9
39											11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
40				Not Analyzed								11	11	11	11	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10	10
41												12	12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11
42												13	13	13	13	13	13	13	13	12	12	12	12	12	12	12	12	12	12	12	12
43													14	14	14	14	14	14	14	13	13	13	13	13	13	13	13	13	13	13	13
44														15	15	15	15	15	15	15	14	14	14	14	14	14	14	14	14	14	14
45														16	16	16	16	16	16	16	15	15	15	15	15	15	15	15	15	15	15

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a thirteen-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2g
PWR Fuel Qualification Table for 0.63 kW per Assembly Fuel Without BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				7	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
30						7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
32							8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7
34								9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
36									11	11	11	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
38											13	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11
39											14	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	12	12	12	12
40			Not Analyzed									15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	13	13	13
41												16	16	16	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	14
42												17	17	17	17	17	17	16	16	16	16	16	16	16	16	16	16	16	16	16	16
43													18	18	18	18	18	18	18	18	17	17	17	17	17	17	17	17	17	17	17
44														20	19	19	19	19	19	19	19	19	19	19	18	18	18	18	18	18	18
45														21	21	21	21	20	20	20	20	20	20	20	20	20	20	20	20	19	19

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a sixteen-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2h
PWR Fuel Qualification Table for 0.6 kW per Assembly Fuel Without BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5
28				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6	6	6
30						8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
32							9	9	9	9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
34								10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9
36									12	12	12	12	12	12	12	12	12	11	11	11	11	11	11	11	11	11	11	11	11	11	11
38											14	14	14	14	14	14	14	14	14	13	13	13	13	13	13	13	13	13	13	13	13
39											15	15	15	15	15	15	15	15	15	15	15	15	14	14	14	14	14	14	14	14	14
40			Not Analyzed									17	16	16	16	16	16	16	16	16	16	16	16	16	16	15	15	15	15	15	15
41												18	18	18	18	18	17	17	17	17	17	17	17	17	17	17	17	17	17	17	16
42												19	19	19	19	19	19	19	19	19	18	18	18	18	18	18	18	18	18	18	18
43													21	20	20	20	20	20	20	20	20	20	20	20	20	19	19	19	19	19	19
44														22	22	22	22	21	21	21	21	21	21	21	21	21	21	21	21	20	20
45														23	23	23	23	23	23	23	23	22	22	22	22	22	22	22	22	22	22

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a nineteen-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2i
PWR Fuel Qualification Table for 1.2 kW per Assembly Fuel With BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30						5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
32							5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
34								5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
36									5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
38											5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
39											5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
40				Not Analyzed								5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
41												6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
42												6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5
43													6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5
44														6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
45														6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a six-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2j
PWR Fuel Qualification Table for 0.87 kW per Assembly Fuel With BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/ MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30						5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
32							6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
34								6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
36									7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
38											7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6
39											7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
40				Not Analyzed								8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
41												8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7
42												9	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
43													9	9	9	9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8
44														9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
45														10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a eight-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2k
PWR Fuel Qualification Table for 0.7 kW per Assembly Fuel With BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
28				6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5
30						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
32							7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
34								8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7
36									9	9	9	9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	8	8	8
38											10	10	10	10	10	10	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9
39											11	11	11	11	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
40				Not Analyzed								12	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
41												13	13	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11
42												14	14	13	13	13	13	13	13	13	13	13	13	13	12	12	12	12	12	12	12
43													15	14	14	14	14	14	14	14	14	14	14	14	13	13	13	13	13	13	13
44														16	15	15	15	15	15	15	15	15	15	15	15	14	14	14	14	14	14
45														17	17	16	16	16	16	16	16	16	16	16	16	16	15	15	15	15	15

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a thirteen-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-21
PWR Fuel Qualification Table for 0.63 kW per Assembly Fuel With BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
28				7	7	7	7	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
30						7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
32							8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
34								10	10	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
36									11	11	11	11	11	11	11	11	11	11	11	10	10	10	10	10	10	10	10	10	10	10	10
38											13	13	13	13	13	13	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
39											14	14	14	14	14	14	14	13	13	13	13	13	13	13	13	13	13	13	13	13	13
40			Not Analyzed									15	15	15	15	15	15	15	14	14	14	14	14	14	14	14	14	14	14	14	14
41												16	16	16	16	16	16	16	16	16	16	16	15	15	15	15	15	15	15	15	15
42												18	18	17	17	17	17	17	17	17	17	17	17	17	16	16	16	16	16	16	16
43													19	19	19	19	18	18	18	18	18	18	18	18	18	18	18	17	17	17	17
44														20	20	20	20	20	20	20	19	19	19	19	19	19	19	19	19	19	19
45														22	21	21	21	21	21	21	21	21	21	20	20	20	20	20	20	20	20

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a seventeen-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2m
PWR Fuel Qualification Table for 0.6 kW per Assembly Fuel With BPRAs for the NUHOMS®-32PT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/ MTU)	Initial Enrichment wt % U-235																													
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
15	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
28				7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6
30						8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7
32							9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	8	8	8	8	8	8
34								11	11	11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
36									12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	11	11	11	11	11
38											15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13	13
39											16	16	16	16	16	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
40			Not Analyzed									17	17	17	17	17	17	17	17	16	16	16	16	16	16	16	16	16	16	16	16
41												19	18	18	18	18	18	18	18	18	18	18	18	17	17	17	17	17	17	17	17
42												20	20	20	20	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
43													21	21	21	21	21	21	21	21	20	20	20	20	20	20	20	20	20	20	20
44														23	22	22	22	22	22	22	22	22	22	22	22	21	21	21	21	21	21
45														24	24	24	24	24	23	23	23	23	23	23	23	23	23	23	23	23	22

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 2.0 and greater than 5.0 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 45 GWd/MTU is unacceptable for storage
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a nineteen-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table.

Table 1-2n
PWR Fuel Qualification Table for Zone 1 with 0.7 kW per Assembly, Fuel With or Without BPRAs, for the NUHOMS®-24PHB DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd/MTU)	Assembly Average Initial U-235 Enrichment (wt %)																									
	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5
10	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
15	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
25		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
28			5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
30						6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
32							7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
34								8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
36									9.0	9.0	9.0	9.0	9.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
38											10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	9.5	9.5	9.5	9.5
39											11.5	11.0	11.0	11.0	11.0	11.0	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
40											12.0	12.0	12.0	12.0	12.0	12.0	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.0	11.0	11.0
41											13.0	13.0	13.0	13.0	13.0	13.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.0	12.0	12.0
42											14.5	14.5	14.0	14.0	14.0	14.0	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.0	13.0	13.0
43					Not Analyzed						15.5	15.5	15.5	15.0	15.0	15.0	15.0	15.0	14.5	14.5	14.5	14.5	14.5	14.5	14.0	14.0
44											17.0	16.5	16.5	16.5	16.5	16.0	16.0	16.0	16.0	16.0	15.5	15.5	15.5	15.5	15.5	15.5
45													18.0	17.5	17.5	17.5	17.5	17.0	17.0	17.0	17.0	17.0	16.5	16.5	16.5	16.5
46													18.8	18.7	18.5	18.5	18.3	18.2	18.1	18.0	17.9	17.8	17.7	17.6	17.5	17.4
47													20.1	20.0	19.9	19.6	19.6	19.5	19.4	19.2	19.1	19.0	18.9	18.8	18.7	18.7
48													21.4	21.3	21.1	21.0	20.8	20.8	20.7	20.5	20.4	20.3	20.2	20.1	20.0	19.9
49													22.7	22.6	22.4	22.3	22.1	22.1	21.9	21.8	21.7	21.6	21.5	21.4	21.3	21.2
50															23.7	23.6	23.5	23.4	23.3	23.2	23.0	22.9	22.8	22.7	22.6	22.5
51															25.0	24.9	24.8	24.6	24.5	24.4	24.3	24.2	24.0	23.9	23.8	23.7
52															26.3	26.2	26.0	25.9	25.8	25.7	25.6	25.4	25.3	25.2	25.2	25.0
53															27.5	27.3	27.2	27.1	27.0	26.9	26.8	26.7	26.5	26.4	26.4	26.2
54															28.8	28.6	28.5	28.3	28.2	28.1	28.0	28.0	27.8	27.7	27.6	27.5
55															29.9	29.8	29.7	29.6	29.5	29.3	29.2	29.1	29.0	28.9	28.8	28.7

- BU = Assembly average burnup
- Use burnup and enrichment to lookup minimum cooling time in years. For fuel assemblies reconstituted with up to 10 stainless steel rods only, if the lookup cooling time is less than 9.0 years then a minimum cooling time of 9.0 years shall be used. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment greater than 4.5 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 46.5 GWd/MTU is acceptable for storage after a 19.5 years cooling time as defined by 3.7 wt. % U-235 (rounding down) and 47 GWd/MTU (rounding up) on the qualification table.
- See Figure 1-8 for a description of zones.
- For assemblies fuel reconstituted with Zircaloy clad uranium-oxide rods use the assembly average enrichment to determine the minimum cooling time.

Table 1-2o

PWR Fuel Qualification Table for Zone 2 with 1.0 kW per Assembly, Fuel With or Without BPRAs, for the NUHOMS®-24PHB DSC

(Minimum required years of cooling time after reactor core discharge)

BU	Assembly Average Initial U-235 Enrichment (wt %)																									
(GWd/MTU)	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5
10	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
15	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
25		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
28			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
30						5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
32							5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
34								5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
36									5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
38											6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
39											6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5
40											6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
41											6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0
42											7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
43											7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5
44											7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
45				Not Analyzed									8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.4
46													8.2	8.1	8.0	8.0	7.9	7.8	7.8	7.7	7.7	7.6	7.6	7.5	7.5	7.4
47													8.7	8.6	8.5	8.4	8.4	8.3	8.2	8.2	8.1	8.0	8.0	7.9	7.9	7.8
48													9.2	9.1	9.0	9.0	8.9	8.8	8.7	8.6	8.6	8.5	8.5	8.4	8.3	8.3
49													9.8	9.7	9.6	9.5	9.4	9.3	9.2	9.2	9.1	9.0	9.0	8.9	8.8	8.7
50															10.2	10.1	10.0	9.9	9.8	9.7	9.6	9.6	9.5	9.4	9.3	9.3
51															10.9	10.8	10.7	10.6	10.5	10.3	10.3	10.2	10.1	10.0	9.9	9.9
52															11.6	11.5	11.3	11.2	11.1	11.0	10.9	10.8	10.7	10.6	10.5	10.5
53															12.4	12.2	12.1	12.0	11.9	11.8	11.6	11.5	11.4	11.3	11.2	11.1
54															13.2	13.1	13.0	12.8	12.7	12.5	12.4	12.3	12.2	12.1	12.0	11.9
55															14.1	13.9	13.8	13.6	13.5	13.4	13.2	13.1	13.0	12.9	12.8	12.6

- BU = Assembly average burnup
- Use burnup and enrichment to lookup minimum cooling time in years. For fuel assemblies reconstituted with up to 10 stainless steel rods only, if the lookup cooling time is less than 9.0 years then a minimum cooling time of 9.0 years shall be used. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment greater than 4.5 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 46.5 GWd/MTU is acceptable for storage after a 8.3 years cooling time as defined by 3.7 wt. % U-235 (rounding down) and 47 GWd/MTU (rounding up) on the qualification table.
- See Figure 1-8 for a description of zones.
- For assemblies fuel reconstituted with Zircaloy clad uranium-oxide rods use the assembly average enrichment to determine the minimum cooling time.

Table 1-2p

PWR Fuel Qualification Table for Zone 3 with 1.3 kW per Assembly, Fuel With or Without BPRAs, for the NUHOMS®-24PHB DSC

(Minimum required years of cooling time after reactor core discharge)

BU	Assembly Average Initial U-235 Enrichment (wt %)																									
(GWd/MTU)	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5
10	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
15	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
25		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
28			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
30						5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
32							5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
34								5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
36									5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
38											5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
39											5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
40											5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
41											5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
42											6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
43											6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
44											6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
45			Not Analyzed										6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
46													6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
47													6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
48													6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
49													6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
50															6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
51															6.7	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
52															7.0	6.9	6.9	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
53															7.3	7.2	7.2	7.1	7.1	7.0	6.9	6.9	6.9	6.9	6.9	6.9
54															7.7	7.6	7.5	7.4	7.4	7.3	7.3	7.2	7.1	7.1	7.0	7.0
55															8.0	8.0	7.9	7.8	7.7	7.7	7.6	7.5	7.5	7.4	7.3	7.3

- BU = Assembly average burnup
- Use burnup and enrichment to lookup minimum cooling time in years. For fuel assemblies reconstituted with up to 10 stainless steel rods only, if the lookup cooling time is less than 9.0 years then a minimum cooling time of 9.0 years shall be used. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment greater than 4.5 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 5-years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 46.5 GWd/MTU is acceptable for storage after a 6.2 years cooling time as defined by 3.7 wt. % U-235 (rounding down) and 47 GWd/MTU (rounding up) on the qualification table.
- See Figure 1-8 and 1-9 for a description of zones.
- For fuel assemblies reconstituted with Zircaloy clad uranium-oxide rods use the assembly average enrichment to determine the minimum cooling time.

Table 1-2q
BWR Fuel Qualification Table for NUHOMS®-61BT DSC

(Minimum required years of cooling time after reactor core discharge)

BU (GWd /MTU	Initial Enrichment																														
	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4
10	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
15	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
20	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
25	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4
28					6	6	6	6	6	6	6	6	6	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30					7	7	7	7	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
32					8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	6	6	6
34	Not Acceptable or Not Analyzed				9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7
36					11	11	11	10	10	10	10	10	9	9	9	9	9	9	9	9	8	8	8	8	8	8	8	8	8	8	8
38					14	13	13	12	12	12	12	11	11	11	11	11	10	10	10	10	10	10	9	9	9	9	9	9	9	9	9
39					15	14	14	14	13	13	13	12	12	12	12	11	11	11	11	11	10	10	10	10	10	10	10	9	9	9	9
40					16	16	15	15	15	14	14	14	13	13	13	12	12	12	12	12	11	11	11	11	11	10	10	10	10	10	10

This Table provides an alternate methodology as cross referenced in Table 1-1c and 1-1j for determination of fuel assemblies qualified for storage in NUHOMS®-61BT DSC.

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are conservatively applied in determination of actual values for these two parameters.
- Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.
- Fuel with an initial enrichment less than 1.4 and greater than 4.4 wt.% U-235 is unacceptable for storage.
- Fuel with a burnup greater than 40 GWd/MTU is unacceptable for storage.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 4 years cooling.
- Example: An assembly with an initial enrichment of 3.75 wt. % U-235 and a burnup of 39.5 GWd/MTU is acceptable for storage after a eleven-year cooling time as defined by 3.7 wt. % U-235 (rounding down) and 40 GWd/MTU (rounding up) on the qualification table.

Table 1-3a
PWR Fuel Qualification Table for Zone 1 Fuel with 1.7 kW per Assembly for the NUHOMS®-24PTH DSC (Fuel w/o CCs)

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																															
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25	Not Analyzed		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
34									3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
36										3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
38												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
39												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
40												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
41												4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
42												4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
43												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
44												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
45														4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
46														4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
47														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
48														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
49														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
50																5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
51																5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
52																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5
53																5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
54																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
55																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0
56																6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0
57																6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
58																6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5
59																6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5
60																6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
61																7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0
62																7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5

Note: If stainless steel reconstituted rods are present in the fuel assembly, add an additional year of cooling time.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Table 1-3b
PWR Fuel Qualification Table for Zone 2 Fuel with 2.0 kW per Assembly for the NUHOMS®-24PTH DSC (Fuel w/o CCs)

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																														
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
34									3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
36										3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
38												3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
39												3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
40												3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
41												3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
42												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
43												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0
44												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
45														3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
46														3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
47														4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
48														4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
49														4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
50																4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
51																4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
52																4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
53																4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
54																4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0
55																4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
56																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5
57																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
58																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
59																5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
60																6.0	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
61																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
62																6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel assembly, add an additional year of cooling time.

Note: Page A-53 provides the explanatory Notes and limitations regarding the use of this Table.

Table 1-3c

PWR Fuel Qualification Table for Zone 3 Fuel with 1.5 kW per Assembly for the NUHOMS®-24PTH DSC (Fuel w/o CCs)

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																														
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
34									3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
36										3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
38												4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
39												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
40												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5
41												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
42												4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
43												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
44												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
45														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
46														5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
47														5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
48														5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5
49														5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
51																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0
52																6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
53																6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
54																6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5
55																6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
56																7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0
57																7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
58																7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5
59																7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	7.0
60																8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0
61																8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
62																8.5	8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel, assembly, add an additional year of cooling time.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Table 1-3d

PWR Fuel Qualification Table for Zone 4 Fuel with 1.3 kW per Assembly for the NUHOMS®-24PTH DSC (Fuel w/o CCs)

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																														
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
34									4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
36										4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
38												4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
39												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
40												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
41												5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
42												5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
43												5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5
44												5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
45														5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
46														5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0
47														6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
48														6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
49														6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5
50																6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
51																7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0
52																7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
53																7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5
54																8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
55																8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0
56																8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5
57																9.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
58																9.5	9.5	9.0	9.0	9.0	9.0	9.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0
59																10.0	10.0	9.5	9.5	9.5	9.5	9.5	9.0	9.0	9.0	9.0	9.0	9.0	8.5	8.5	8.5	8.5
60																10.5	10.5	10.0	10.0	10.0	10.0	10.0	9.5	9.5	9.5	9.5	9.5	9.0	9.0	9.0	9.0	9.0
61																11.0	11.0	11.0	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	9.5	9.5	9.5	9.5
62																11.5	11.5	11.5	11.5	11.0	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel, assembly, add an additional year of cooling time or for cooling times less than 10 years.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Table 1-3e
PWR Fuel Qualification Table for Zone 1 Fuel with 1.7 kW per Assembly for the NUHOMS®-24PTH DSC (Fuel w/ CCs)

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																														
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
34									3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
36										3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
38												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0
39												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
40												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
41												4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
42												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
43												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5
44												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
45														4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
46														4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
47														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
48														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0
49														4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
50																5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
51																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
52																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5
53																5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
54																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
55																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0
56																6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
57																6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
58																6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5
59																6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
60																6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
61																7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0
62																7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel, assembly, add an additional year of cooling time.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Table 1-3f

PWR Fuel Qualification Table for Zone 2 Fuel with 2.0 kW per Assembly for the NUHOMS®-24PTH DSC (Fuel w/ CCs)

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																														
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
34									3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
36										3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
38												3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
39												3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
40												3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
41												3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
42												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
43												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0
44												3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
45														3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
46														4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
47														4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
48														4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
49														4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5
50																4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
51																4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
52																4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
53																4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0
54																4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0
55																4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
56																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5
57																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
58																5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
59																5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
60																6.0	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
61																6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
62																6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel, assembly, add an additional year of cooling time.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Table 1-3g
PWR Fuel Qualification Table for Zone 3 Fuel with 1.5 kW per Assembly for the NUHOMS®*-24PTH DSC (Fuel w/ CCs)*

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																															
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
34									3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
36										3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
38												4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
39												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5
40												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
41												4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
42												4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
43												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
44												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0
45														5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
46														5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
47														5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5
48														5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
49														5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
50																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
51																5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0
52																6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
53																6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5
54																6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5
55																6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
56																7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0
57																7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
58																7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5
59																7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
60																8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0
61																8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
62																9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel, assembly, add an additional year of cooling time.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Table 1-3h

PWR Fuel Qualification Table for Zone 4 Fuel with 1.3 kW per Assembly for the NUHOMS®*-24PTH DSC (Fuel w/ CCs)*

(Minimum required years of cooling time after reactor core discharge)

Burn-Up, GWD/MT	Assembly Average Initial U-235 Enrichment, wt %																														
	1.5	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
10	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
15	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
20	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
25			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
28				3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
30							3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
32								3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
34									4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
36										4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
38												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
39												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0
40												4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
41												5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
42												5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
43												5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5
44												5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
45														5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
46														5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.0
47														6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
48														6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
49														6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
50																6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
51																7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0
52																7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
53																7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.5
54																8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0
55																8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0
56																8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5
57																9.0	9.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0
58																9.5	9.5	9.5	9.5	9.0	9.0	9.0	9.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.0
59																10.0	10.0	10.0	10.0	9.5	9.5	9.5	9.5	9.5	9.0	9.0	9.0	9.0	9.0	8.5	8.5	8.5
60																10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	9.5	9.5	9.5	9.5	9.5	9.5	9.0	9.0
61																11.0	11.0	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	9.5	9.5	9.5
62																12.0	11.5	11.5	11.5	11.5	11.0	11.0	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0

Not Analyzed

Note: If stainless steel reconstituted rods are present in the fuel, assembly, add an additional year of cooling time for cooling times less than 10 years.

Note: Page A-53 provides the explanatory notes and limitations regarding the use of this Table.

Notes: Tables 1-3a through 1-3h:

- *Burnup = Assembly Average burnup.*
- *Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are correctly accounted for during fuel qualification.*
- *Round burnup UP to next higher entry, round enrichments DOWN to next lower entry.*
- *Fuel with an assembly average initial enrichment less than 1.5 (or less than the minimum provided above for each burnup) and greater than 5.0 wt.% U-235 is unacceptable for storage.*
- *Fuel with a burnup greater than 62 GWd/MTU is unacceptable for storage.*
- *Fuel with a burnup less than 10 GWd/MTU is acceptable for storage after 3-years cooling.*
- *See Figures 1-11 through 1-15 for the description of Zones.*
- *For fuel assemblies reconstituted with uranium-oxide rods, use the assembly average equivalent enrichment to determine the minimum cooling time.*
- *The cooling times for damaged and intact assemblies are identical.*
- *Example: An intact fuel assembly without CCs, with a decay heat load of 1.7 kW or less, an initial enrichment of 3.65 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for storage after a 4.0 year cooling time as defined by 3.6 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) in Table 1-3a.*

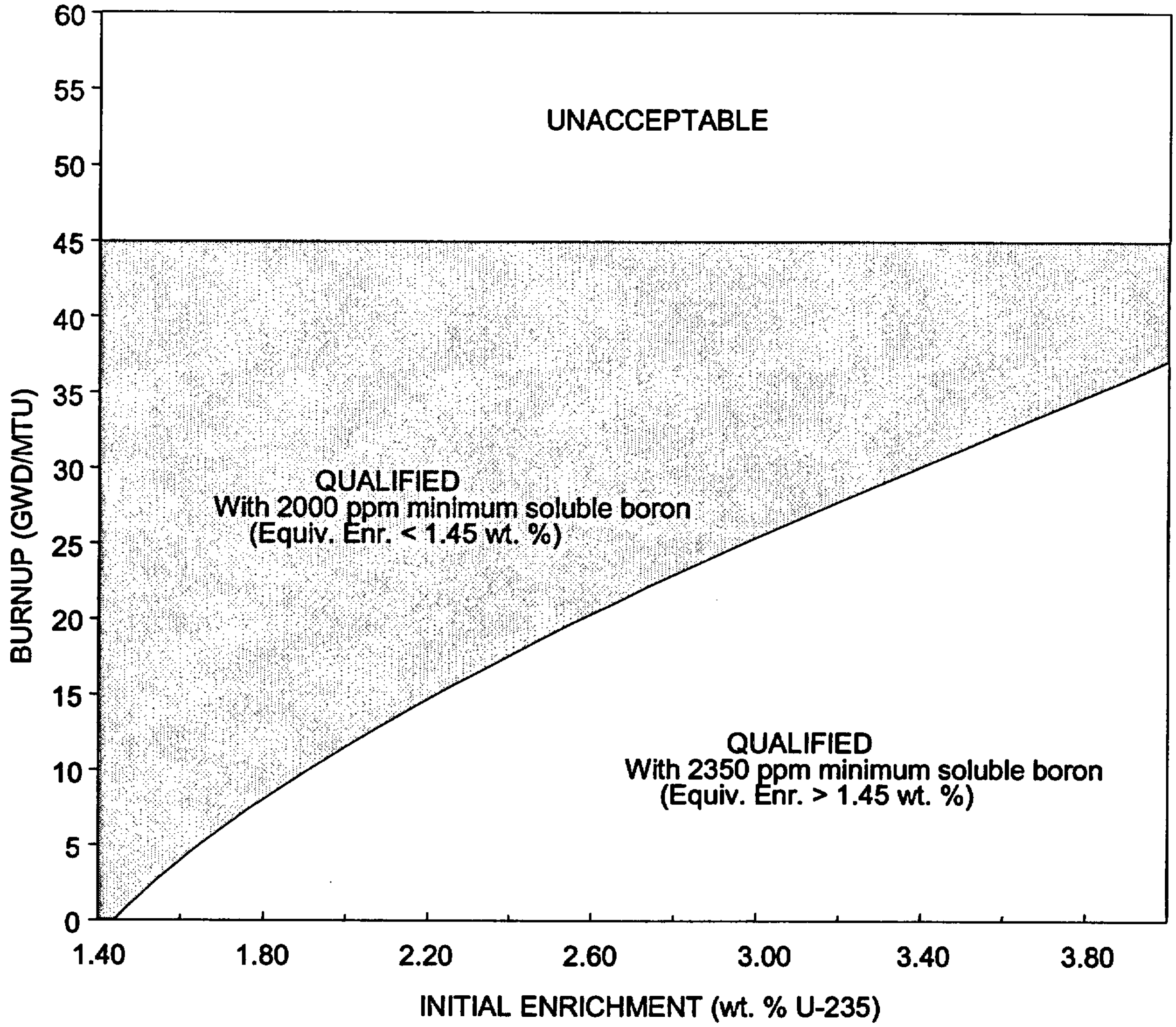

Figure 1-1
PWR Fuel Criticality Acceptance Curve

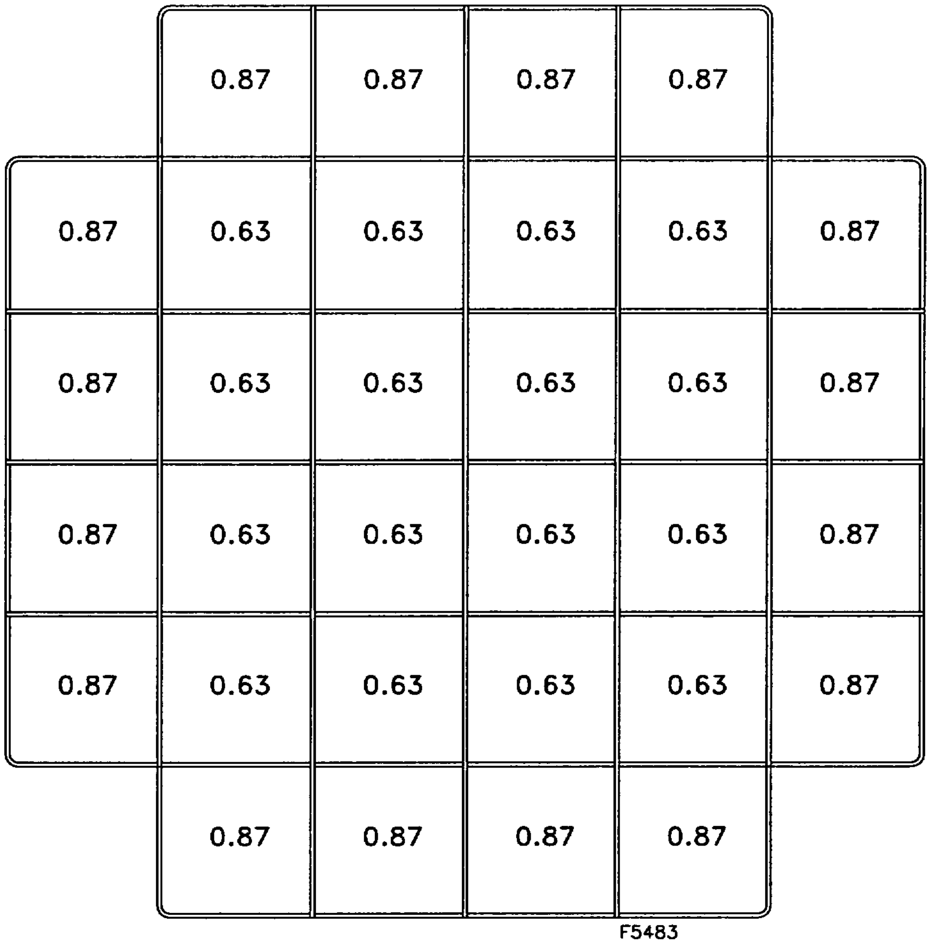

Figure 1-2
Heat Load Zoning Configuration 1 for the NUHOMS®-32PT DSC

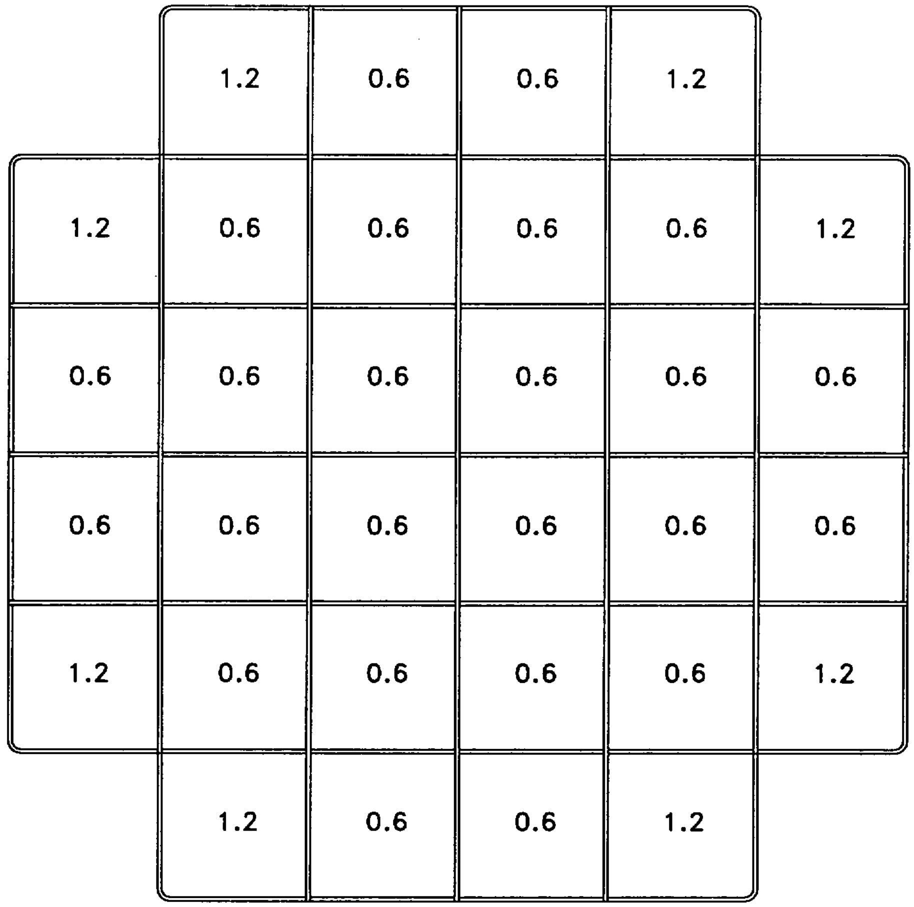

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Figure 1-3
Heat Load Zoning Configuration 2 for the NUHOMS®-32PT DSC

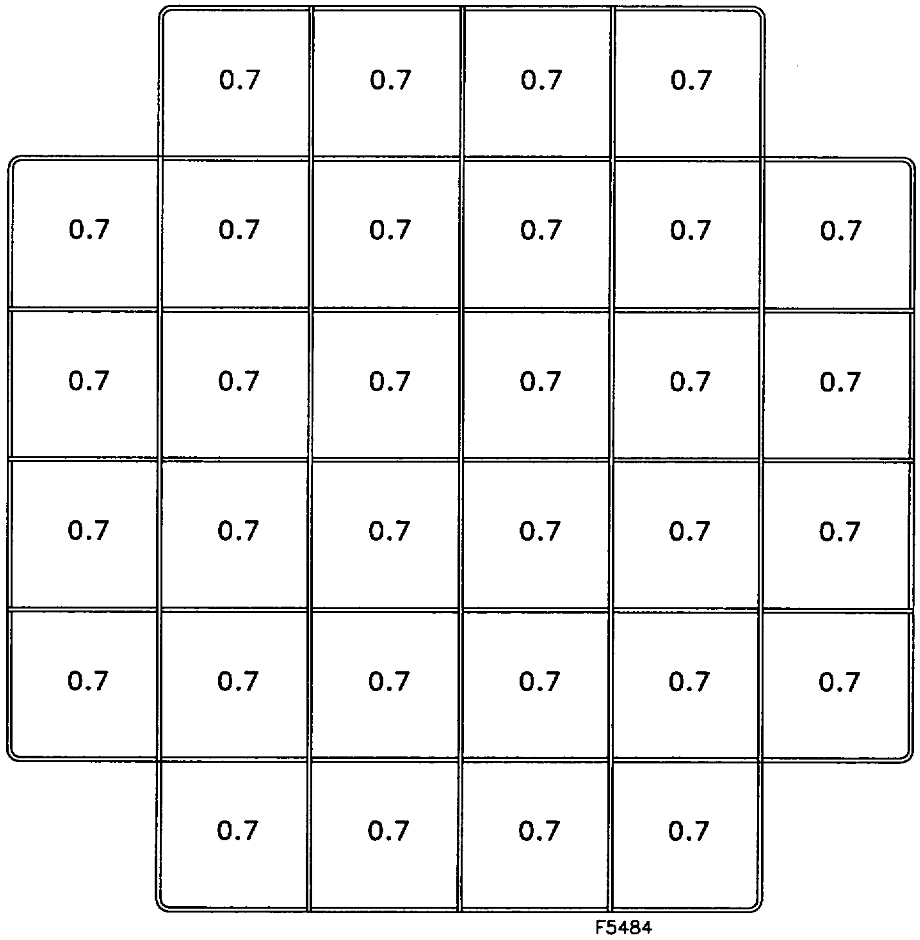


Figure 1-4
Heat Load Zoning Configuration 3 for the NUHOMS®-32PT DSC

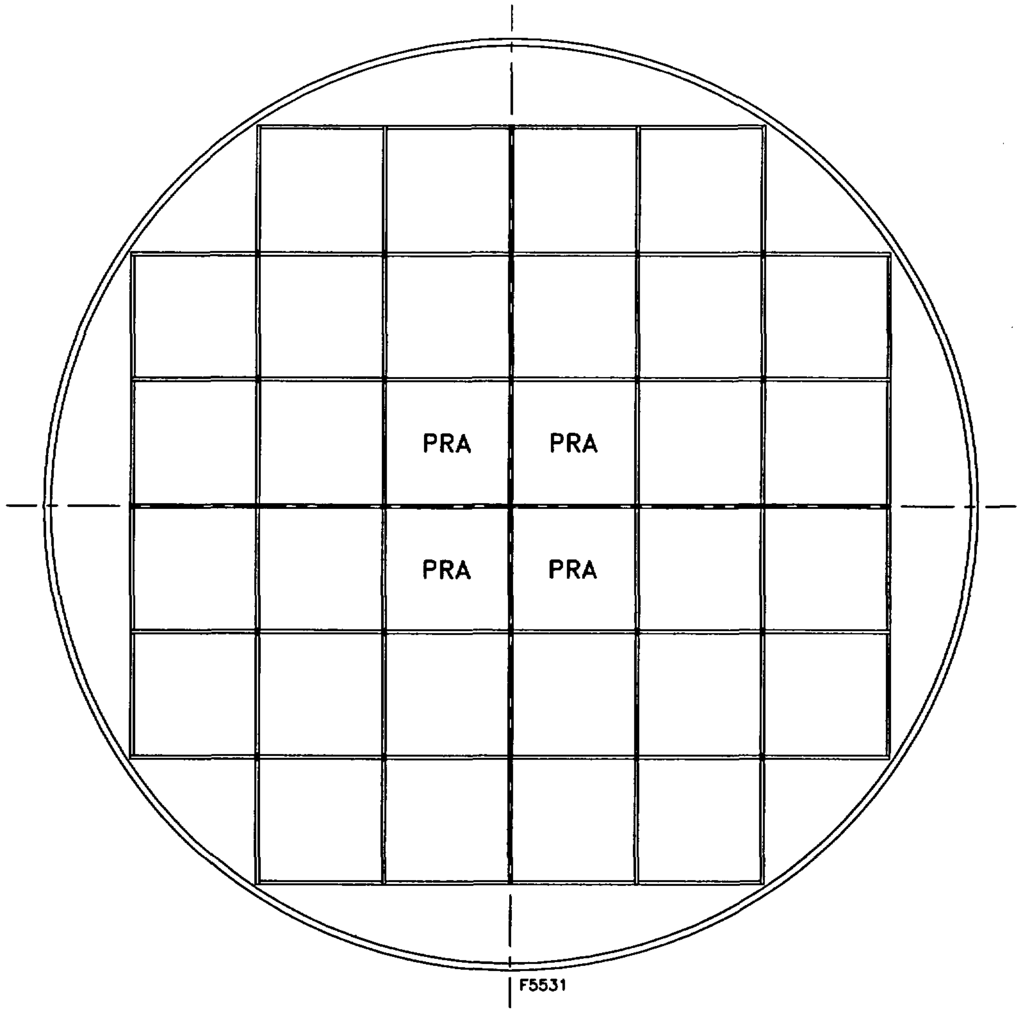
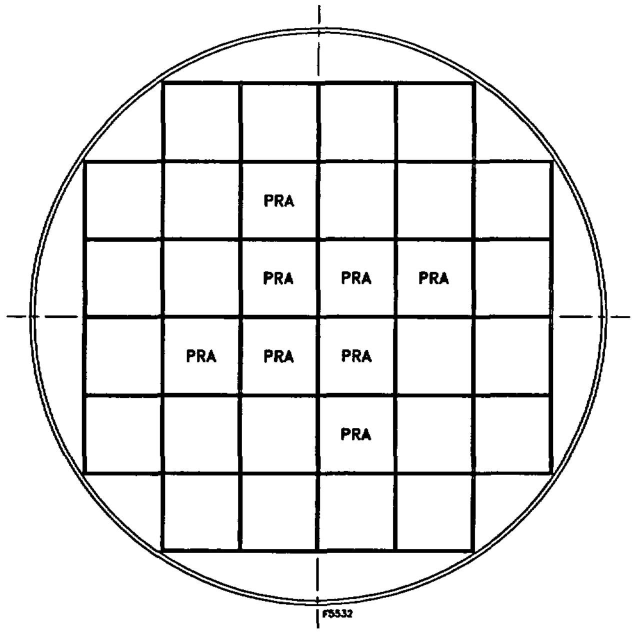


Figure 1-5
Required PRA Locations for the NUHOMS®-32PT DSC Configuration with Four PRAs



Or

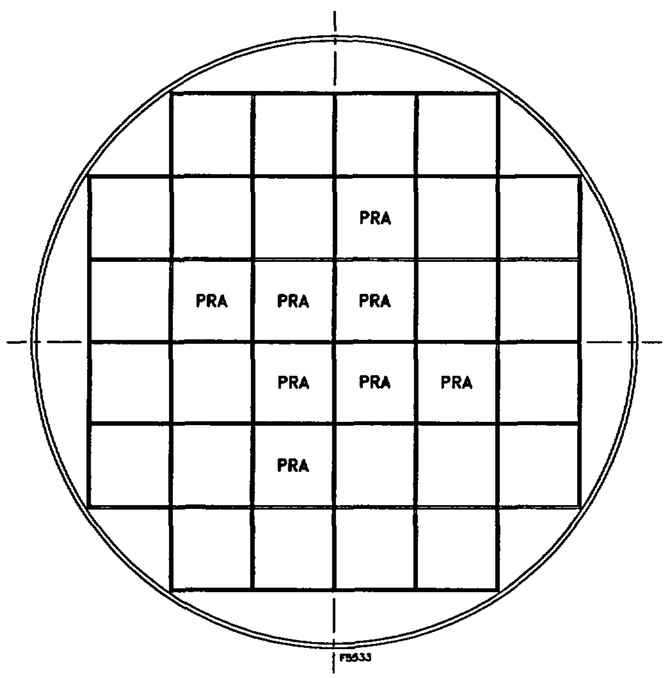


Figure 1-6
Required PRA Locations for the NUHOMS®-32PT DSC Configuration with Eight PRAs

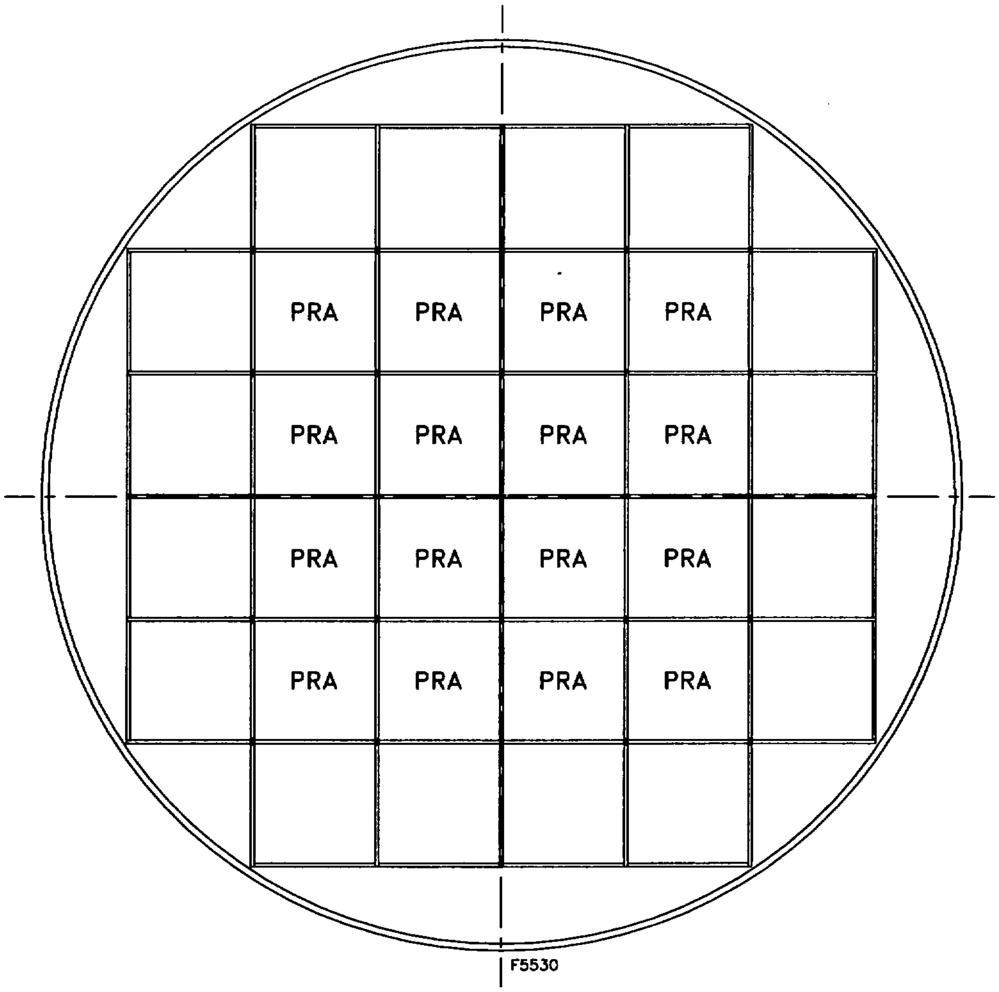
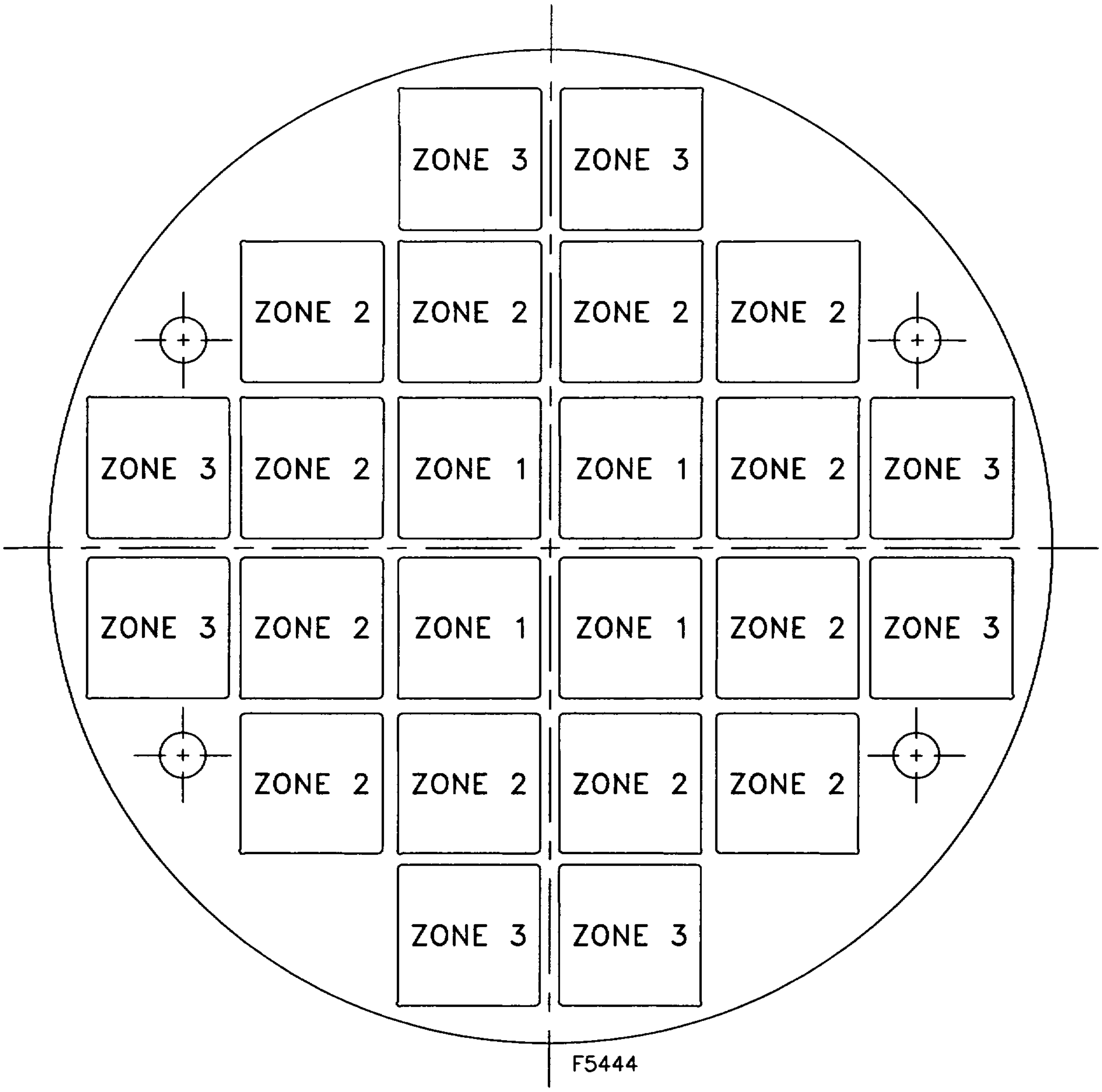
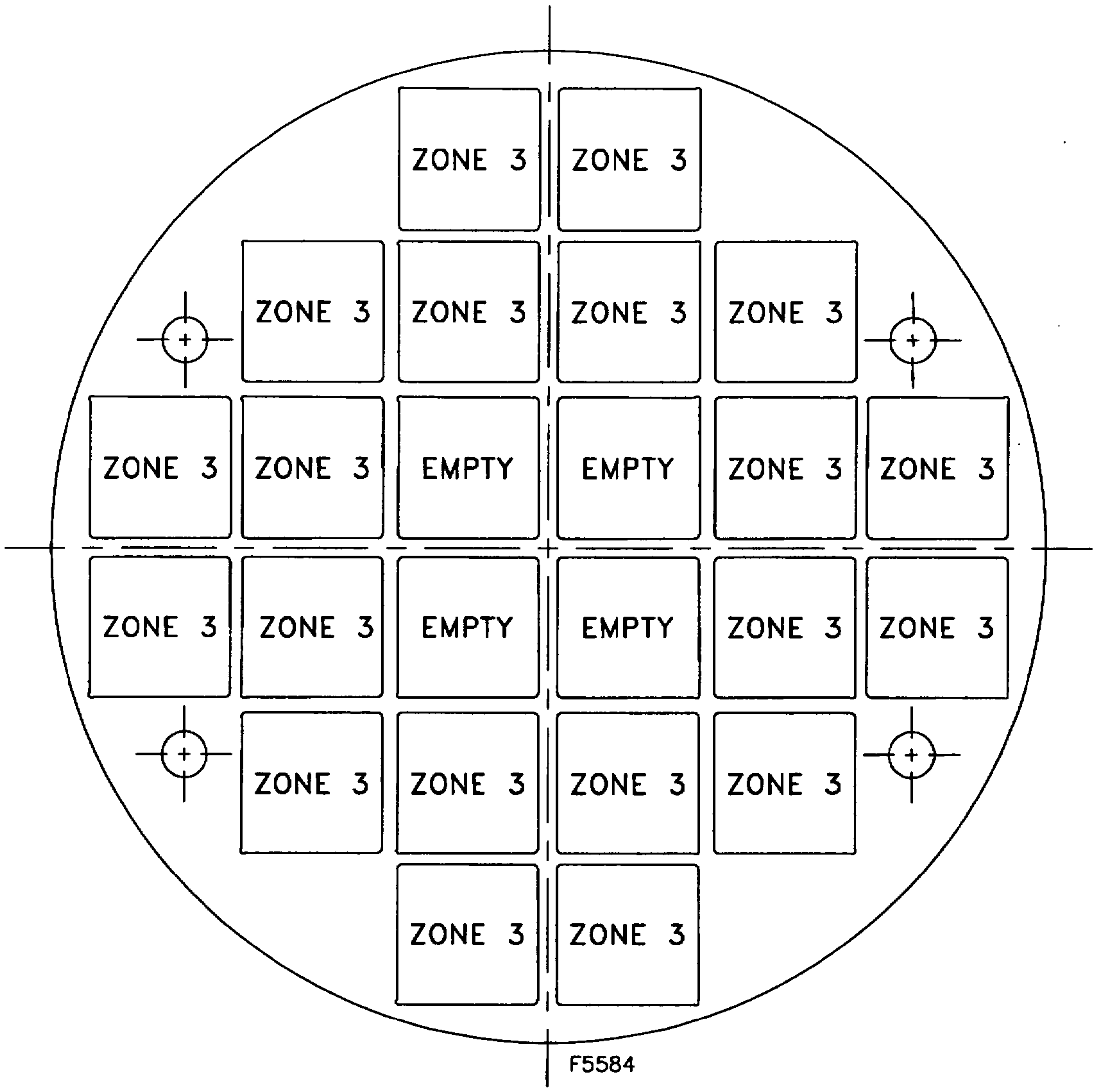


Figure 1-7
Required PRA Locations for the NUHOMS®-32PT DSC Configuration with Sixteen PRAs



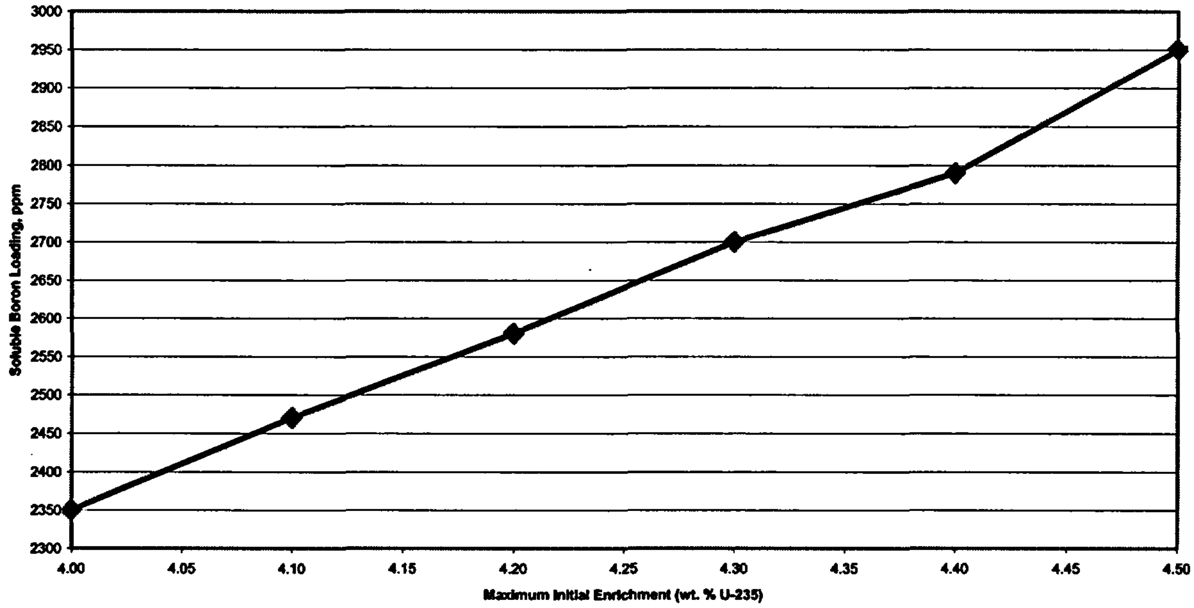
	Zone 1	Zone 2	Zone 3
Maximum Decay Heat (kW / FA)	0.7	1.0	1.3
Maximum Decay Heat per Zone (kW)	2.8	10.8	10.4

Figure 1-8
Heat Load Zoning Configuration for Fuel Assemblies (With or Without BPRAs) Stored in NUHOMS®-24PHB DSC – Configuration 1



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

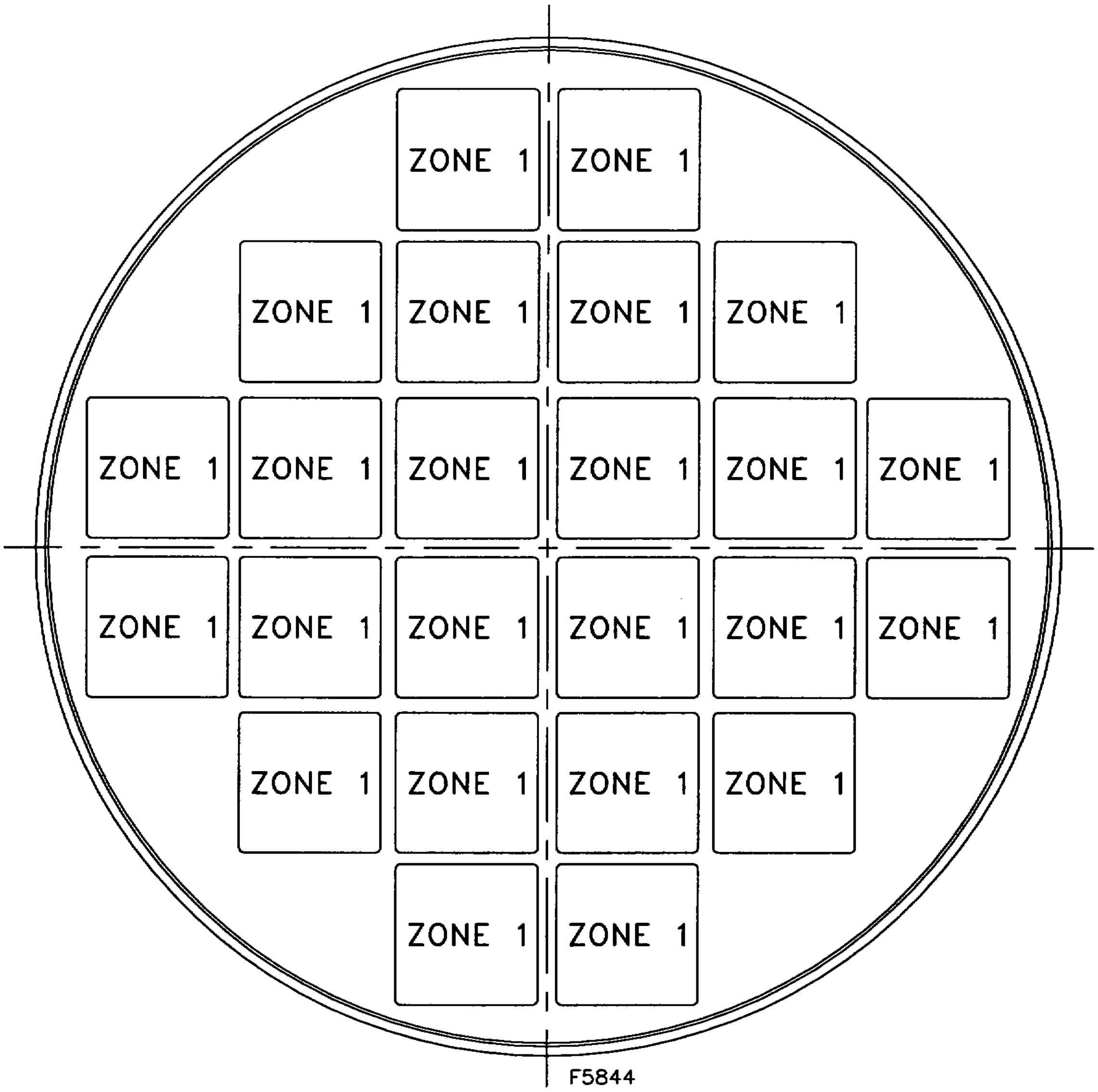
Figure 1-9
Heat Load Zoning Configuration for Fuel Assemblies (With or Without BPRAs) Stored in NUHOMS®-24PHB DSC – Configuration 2



Linear Interpolation allowed between points

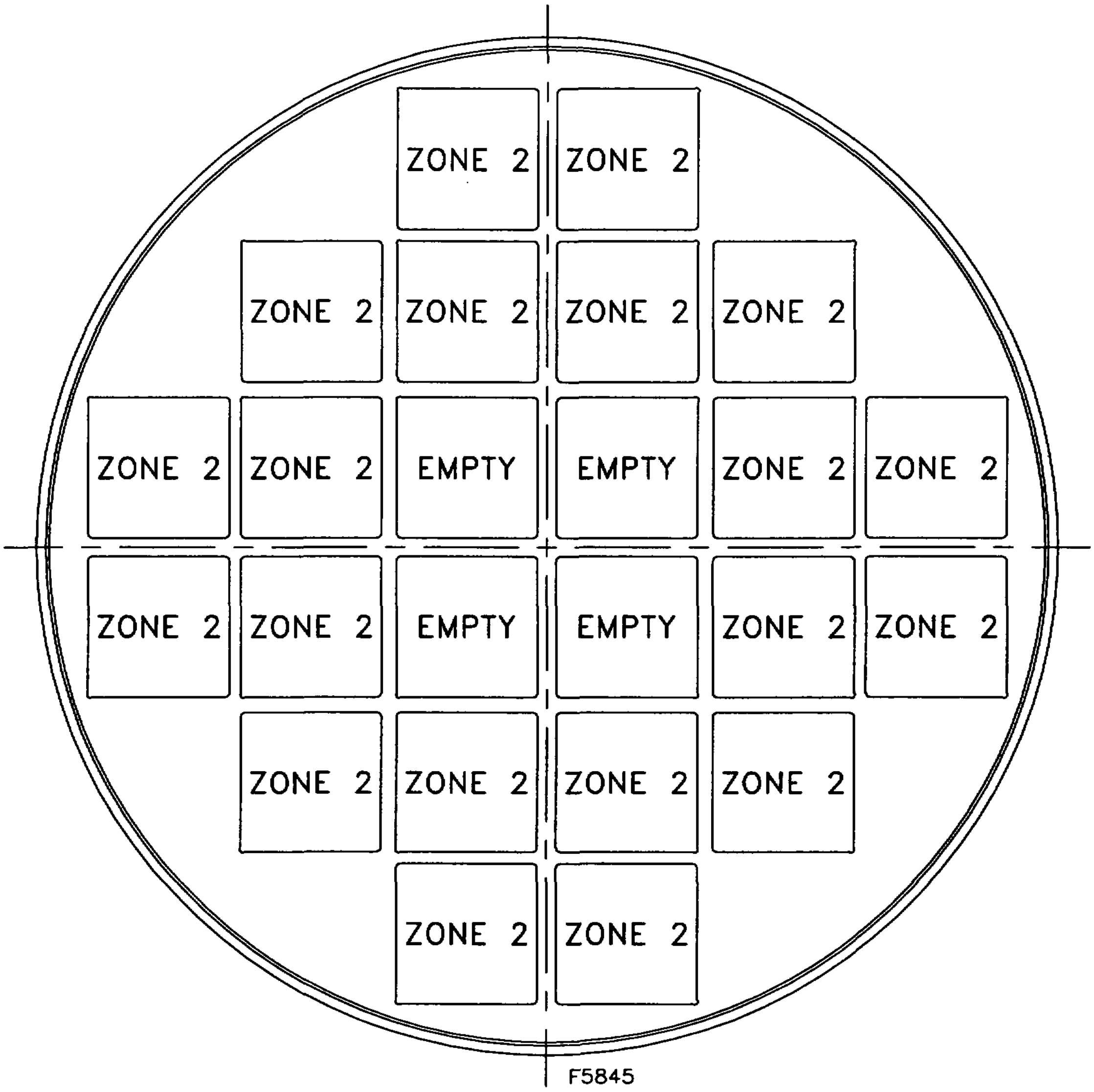
Initial Enrichment	Boron Loading, ppm
≤ 4.0	2350
4.1	2470
4.2	2580
4.3	2700
4.4	2790
4.5	2950

Figure 1-10
Soluble Boron Concentration vs. Fuel Initial U-235 Enrichment for the 24PHB System



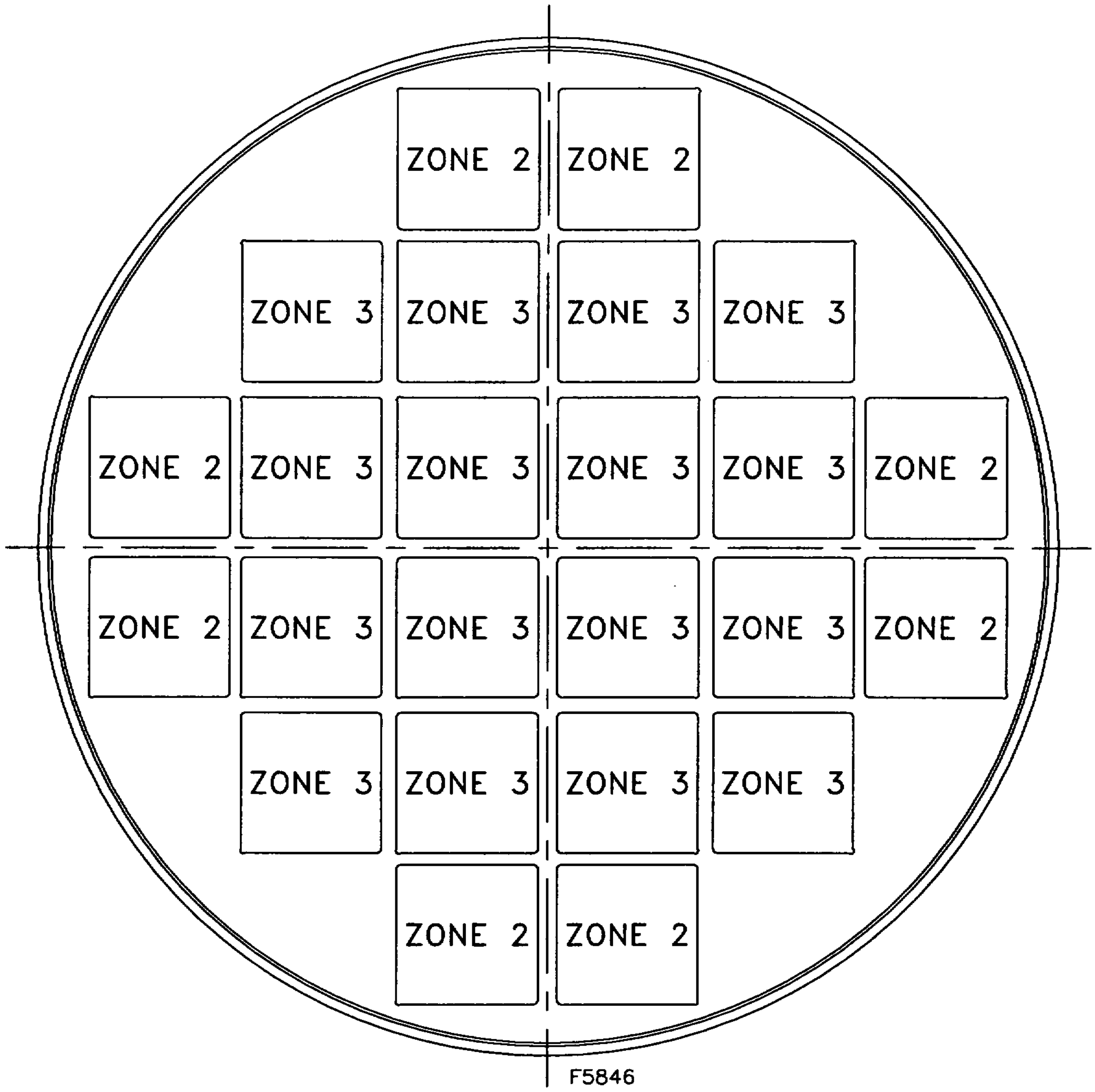
	Zone 1	*Zone 2*	*Zone 3*	*Zone 4*
Maximum Decay Heat (kW/FA)	*1.7*	*NA*	*NA*	*NA*
Maximum Decay Heat per Zone (kW)	*40.8*	*NA*	*NA*	*NA*

Figure 1-11
Heat Load Zoning Configuration No. 1 for 24PTH-S and 24PTH-L DSCs (with or without Control Components)



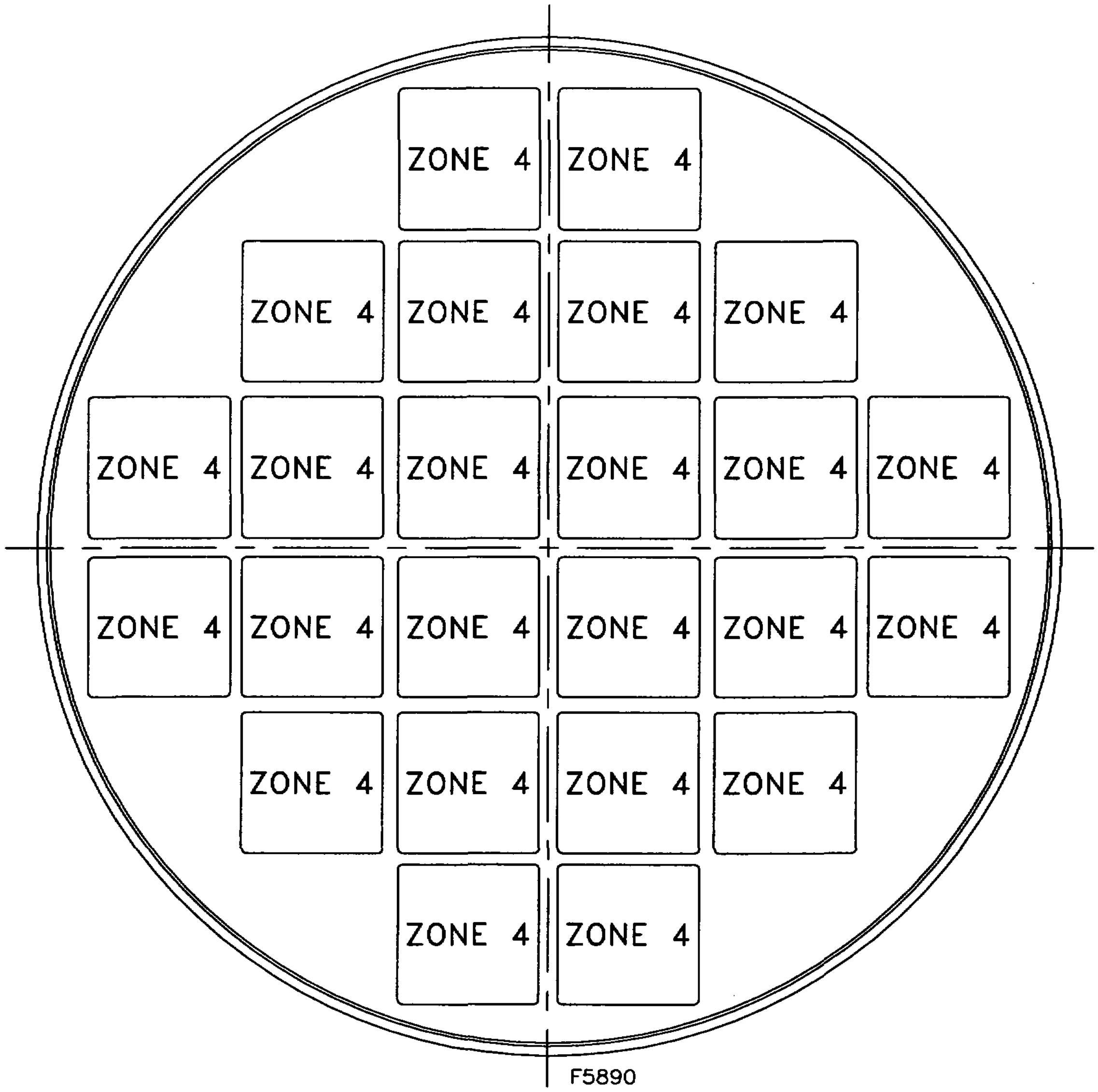
	Zone 1	*Zone 2*	*Zone 3*	*Zone 4*
Maximum Decay Heat (kW/FA)	*NA*	*2.0*	*NA*	*NA*
Maximum Decay Heat per Zone (kW)	*NA*	*40.0*	*NA*	*NA*

Figure 1-12
Heat Load Zoning Configuration No. 2 for 24PTH-S and 24PTH-L DSCs (with or without Control Components)



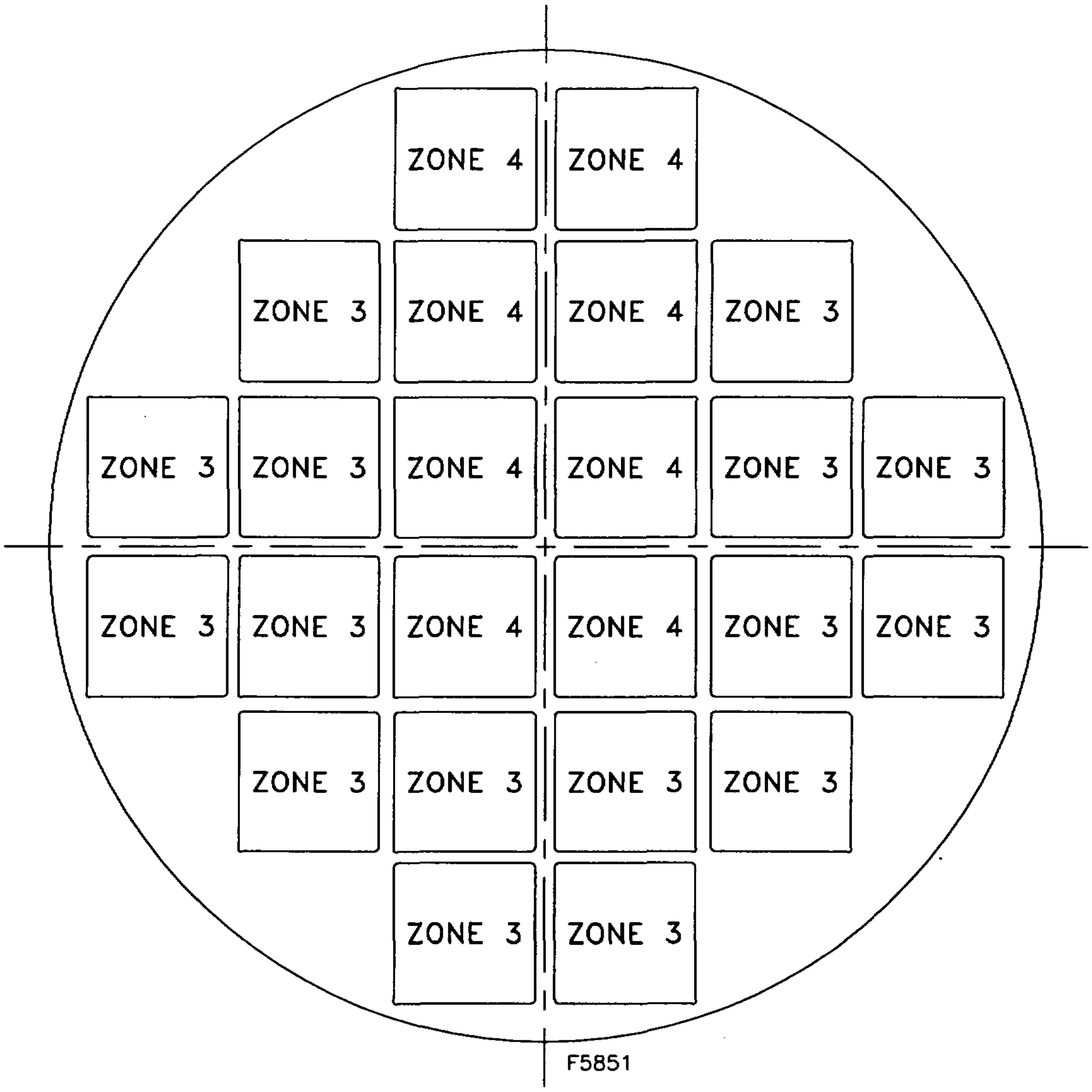
	Zone 1	*Zone 2*	*Zone 3*	*Zone 4*
Maximum Decay Heat (kW/FA)	*NA*	*2.0*	*1.5*	*NA*
Maximum Decay Heat per Zone (kW)	*NA*	*16*	*24*	*NA*

Figure 1-13
Heat Load Zoning Configuration No. 3 for 24PTH-S and 24PTH-L DSCs (with or without Control Components)



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

Figure 1-14
Heat Load Zoning Configuration No. 4 for 24PTH-S and 24PTH-L DSCs (with or without Control Components)

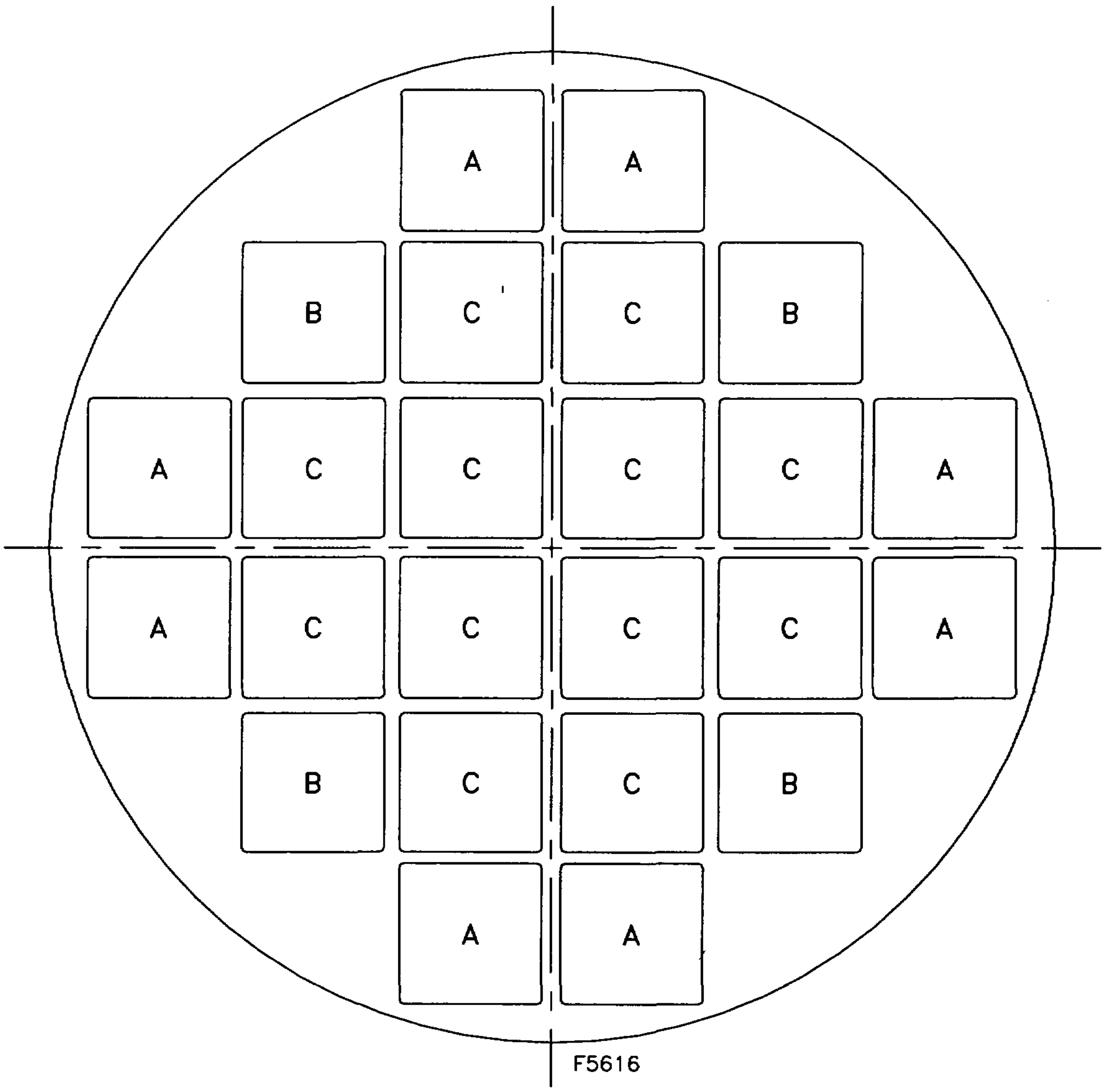


	Zone 1	*Zone 2*	*Zone 3*	*Zone 4*
Maximum Decay Heat (kW/FA)	*NA*	*NA*	*1.5*	*1.3*
Maximum Decay Heat per Zone (kW)	*NA*	*NA*	*Note 1*	*10.4*

Notes:

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 (without aluminum inserts).*

Figure 1-15
Heat Load Zoning Configuration No. 5 for 24PTH-S-LC DSC (with or without Control Components)



Notes:

1. *Locations identified as "A" are for placement of up to 8 damaged or intact fuel assemblies.*
2. *Locations identified as "B" are for placement of up to 4 additional damaged or intact fuel assemblies (Maximum of 12 damaged fuel assemblies allowed, Locations "A" and "B" combined).*
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 Damaged Fuel Inside 24PTH DSC

1.2.2 DSC Vacuum Pressure During Drying

Limit/Specification:

Vacuum Pressure:	≤3 mm Hg
Time at Pressure:	≥30 minutes following stepped evacuation
Number of Pump-Downs:	2

Applicability: This is applicable to all DSCs.

Objective: To ensure a minimum water content.

Action: If the required vacuum pressure cannot be obtained:

1. Confirm that the vacuum drying system is properly installed.
2. Check and repair, or replace, the vacuum pump.
3. Check and repair the system as necessary.
4. Check and repair the seal weld between the inner top cover plate and the DSC shell.

Surveillance: No maintenance or tests are required during normal storage. Surveillance of the vacuum gauge is required during the vacuum drying operation.

Bases: A stable vacuum pressure of ≤3 mm Hg further ensures that all liquid water has evaporated in the DSC cavity, and that the resulting inventory of oxidizing gases in the DSC is well below the 0.25 volume %.

1.2.3 24P and 52B DSC Helium Backfill Pressure

Limit/Specifications:

Helium 2.5 psig ± 2.5 psig backfill pressure (stable for 30 minutes after filling).

Applicability: This specification is applicable to 24P and 52B DSCs only.

Objective: To ensure that: (1) the atmosphere surrounding the irradiated fuel is a non-oxidizing inert gas; (2) the atmosphere is favorable for the transfer of decay heat.

Action: If the required pressure cannot be obtained:

1. Confirm that the vacuum drying system and helium source are properly installed.
2. Check and repair or replace the pressure gauge.
3. Check and repair or replace the vacuum drying system.
4. Check and repair or replace the helium source.
5. Check and repair the seal weld *between the inner top cover and the DSC shell.*

If pressure exceeds the criterion, release a sufficient quantity of helium to lower the DSC cavity pressure.

Surveillance: No maintenance or tests are required during the normal storage. Surveillance of the pressure gauge is required during the helium backfilling operation.

Bases: The value of 2.5 psig was selected to ensure that the pressure within the DSC is within the design limits during any expected normal and off-normal operating conditions.

1.2.3a 61BT, 32PT, 24PHB and 24PTH DSC Helium Backfill Pressure

Limit/Specifications:

Helium 2.5 psig ± 1.0 psig backfill pressure (stable for 30 minutes after filling).

Applicability: This specification is applicable to 61BT, 32PT, 24PHB and 24PTH DSC only.

Objective: To ensure that: (1) the atmosphere surrounding the irradiated fuel is a non-oxidizing inert gas; (2) the atmosphere is favorable for the transfer of decay heat.

Action: If the required pressure cannot be obtained:

1. Confirm that the vacuum drying system and helium source are properly installed.
2. Check and repair or replace the pressure gauge.
3. Check and repair or replace the vacuum drying system.
4. Check and repair or replace the helium source.
5. Check and repair the seal weld *between the inner top cover and the DSC shell.*

If pressure exceeds the criterion, release a sufficient quantity of helium to lower the DSC cavity pressure.

Surveillance: No maintenance or tests are required during the normal storage. Surveillance of the pressure gauge is required during the helium backfilling operation.

Bases: The value of 2.5 psig was selected to ensure that the pressure within the DSC is within the design limits during any expected normal and off-normal operating conditions.

1.2.4 24P and 52B DSC Helium Leak Rate of Inner Seal Weld

Limit/Specification:

$\leq 1.0 \times 10^{-4}$ atm · cubic centimeters per second (atm · cm^3/s) at the highest DSC limiting pressure.

Applicability: This specification is applicable to the inner top cover plate seal weld of the 24P and 52B DSCs only.

Objective:

1. To limit the total radioactive gases normally released by each canister to negligible levels. Should fission gases escape the fuel cladding, they will remain confined by the DSC confinement boundary.

2. To retain helium cover gases within the DSC and prevent oxygen from entering the DSC. The helium improves the heat dissipation characteristics of the DSC and prevents any oxidation of fuel cladding.

Action: If the leak rate test of the inner seal weld exceeds 1.0×10^{-4} (atm · cm^3/s):

1. Check and repair the DSC drain and fill port fittings for leaks.

2. Check and repair the inner seal weld.

3. Check and repair the inner top cover plate for any surface indications resulting in leakage.

Surveillance: After the welding operation has been completed, perform a leak test with a helium leak detection device.

Bases: If the DSC leaked at the maximum acceptable rate of 1.0×10^{-4} atm · cm^3/s for a period of 20 years, about 63,100 cc of helium would escape from the DSC. This is about 1% of the 6.3×10^6 cm^3 of helium initially introduced in the DSC. This amount of leakage would have a negligible effect on the inert environment of the DSC cavity. (Reference: American National Standards Institute, ANSI N14.5-1987, For Radioactive Materials—Leakage Tests on Packages for Shipment," Appendix B3).

1.2.4a 61BT, 32PT, 24PHB and *24PTH DSC* Helium Leak Rate of Inner Seal Weld

Limit/Specification:

$\leq 1.0 \times 10^{-7}$ reference cubic centimeters per second (cc/s).

Applicability: This specification is applicable to the inner top cover plate seal weld of 61BT, 32PT 24PHB and *24PTH* DSC only.

Objective:

1. To demonstrate that the top cover plate to be "leak tight", as defined in "American National Standard for Leakage Tests on Packages for Shipment of Radioactive Materials," ANSI N14.5 – 1997..

2. To retain helium cover gases within the DSC and prevent oxygen from entering the DSC. The helium improves the heat dissipation characteristics of the DSC and prevents any oxidation of fuel cladding.

Action: If the leak rate test of the inner seal weld exceeds 1.0×10^{-7} reference cc/s:

1. Check and repair the inner seal weld.

2. Check and repair the inner top cover plate for any surface indications resulting in leakage.

Surveillance: After the welding operation has been completed, perform a leak test with a helium leak detection device.

Bases: The61BT, 32PT, 24PHB *and 24PTH* DSC will maintain an inert atmosphere around the fuel and radiological consequences will be negligible, since it is designed and tested to be leak tight.

1.2.5 DSC Dye Penetrant Test of Closure Welds

Limit/Specification:

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.

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

Objective: To ensure that the DSC is adequately sealed in a redundant manner and leak tight.

Action: If the liquid penetrant test indicates that the weld is unacceptable:

1. The weld shall be repaired in accordance with approved ASME procedures.

2. The new weld shall be re-examined in accordance with this specification.

Surveillance: During DSC closure operations. No additional surveillance is required for this operation.

Bases: Article NB-5000 Examination, ASME Boiler and Pressure Vessel Code, Section III, Division 1, Sub-Section NB.

1.2.6 Deleted

1.2.7 HSM Dose Rates with a Loaded 24P, 52B or 61BT DSC

Limit/Specification:

Dose rates at the following locations shall be limited to levels which are less than or equal to:

a. 400 mrem/hr at 3 feet from the HSM surface.

b. Outside of HSM door on center line of DSC 100 mrem/hr.

c. End shield wall exterior 20 mrem/hr.

Applicability: This specification is applicable to all HSMs which contain a loaded 24P, 52B or 61BT DSC.

Objective: The dose rate is limited to this value to ensure that the cask (DSC) has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable (ALARA) at locations on the HSMs where surveillance is performed, and to reduce off-site exposures during storage.

Action:

a. If specified dose rates are exceeded, the following actions should be taken:

   1. Ensure that the DSC is properly positioned on the support rails.

   2. Ensure proper installation of the HSM door.

   3. Ensure that the required module spacing is maintained.

   4. Confirm that the spent fuel assemblies contained in the DSC conform to the specifications of Section 1.2.1.

   5. Install temporary or permanent shielding to mitigate the dose to acceptable levels in accordance with 10 CFR Part 20, 10 CFR 72.104(a), and ALARA.

b. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: The HSM and ISFSI shall be checked to verify that this specification has been met after the DSC is placed into storage and the HSM door is closed.

Basis: The basis for this limit is the shielding analysis presented in Section 7.0, Appendix J, and Appendix K of the FSAR. The specified dose rates provide as-low-as-is-reasonably-achievable on-site and off-site doses in accordance with 10 CFR Part 20 and 10 CFR 72.104(a).

1.2.7a HSM Dose Rates with a Loaded 32PT DSC Only

Limit/Specification:

Dose rates at the following locations shall be limited to levels which are less than or equal to:

a. 800 mrem/hr on the HSM front surface.

b. 200 mrem/hr on the HSM door centerline.

c. 8 mrem/hr on the end shield wall exterior.

Applicability: This specification is applicable to all HSMs which contain a loaded 32PT DSC.

Objective: The dose rate is limited to this value to ensure that the cask (DSC) has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable (ALARA) at locations on the HSMs where surveillance is performed, and to reduce off-site exposures during storage.

Action:

a. If specified dose rates are exceeded, the following actions should be taken:

   1. Ensure that the DSC is properly positioned on the support rails.

   2. Ensure proper installation of the HSM door.

   3. Ensure that the required module spacing is maintained.

   4. Confirm that the spent fuel assemblies contained in the DSC conform to the specifications of Section 1.2.1.

   5. Install temporary or permanent shielding to mitigate the dose to acceptable levels in accordance with 10 CFR Part 20, 10 CFR 72.104(a), and ALARA.

b. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: The HSM and ISFSI shall be checked to verify that this specification has been met after the DSC is placed into storage and the HSM door is closed.

Basis: The basis for this limit is the shielding analysis presented in Appendix M of the FSAR. The specified dose rates provide as-low-as-is-reasonably-achievable on-site and off-site doses in accordance with 10 CFR Part 20 and 10 CFR 72.104(a).

1.2.7b HSM Dose Rates with a Loaded 24PHB DSC Only

Limit/Specification:

Peak dose rates at the following locations shall be limited to levels which are less than or equal to:

a. 500 mrem/hr on the HSM front surface.

b. 20 mrem/hr on the HSM door centerline.

c. 300 mrem/hr on the end shield wall exterior.

Applicability: This specification is applicable to all HSMs which contain a loaded 24PHB DSC.

Objective: The peak dose rate is limited to this value to ensure that the cask (DSC) has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable (ALARA) at locations on the HSMs where surveillance is performed, and to reduce off-site exposures during storage.

Action:

a. If specified dose rates are exceeded, the following actions should be taken:

1. Ensure that the DSC is properly positioned on the support rails.
2. Ensure proper installation of the HSM door.
3. Ensure that the required module spacing is maintained.
4. Confirm that the spent fuel assemblies contained in the DSC conform to the specifications of Section 1.2.1.
5. Install temporary or permanent shielding to mitigate the dose to acceptable levels in accordance with 10 CFR Part 20, 10 CFR 72.104(a), and ALARA.

b. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: The HSM and ISFSI shall be checked to verify that this specification has been met after the DSC is placed into storage and the HSM door is closed.

Basis: The basis for this limit is the shielding analysis presented in Appendix N of the FSAR. The specified dose rates provide as-low-as-is-reasonably-achievable on-site and off-site doses in accordance with 10 CFR Part 20 and 10 CFR 72.104(a).

1.2.7c HSM-H Dose Rates with a Loaded 24PTH-S or 24PTH-L DSC Only

Limit/Specification:

Peak dose rates at the following locations shall be limited to levels which are less than or equal to:

a. 1300 mrem/hr on the HSM-H front surface.

b. 5 mrem/hr on the HSM-H door centerline.

c. 10 mrem/hr on the end shield wall exterior.

Applicability: *This specification is applicable to all HSM-H modules which contain a loaded 24PTH-S or 24PTH-L DSC.*

Objective: *The peak dose rate is limited to this value to ensure that the cask (DSC) has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable (ALARA) at locations on the HSM-H where surveillance is performed, and to reduce off-site exposures during storage.*

Action:

a. If specified dose rates are exceeded, the following actions should be taken:

1. *Ensure that the DSC is properly positioned on the support rails.*
2. *Ensure proper installation of the HSM-H door.*
3. *Confirm that the spent fuel assemblies contained in the DSC conform to the specifications of Section 1.2.1.*
4. *Install temporary or permanent shielding to mitigate the dose to acceptable levels in accordance with 10 CFR Part 20, 10 CFR 72.104(a), and ALARA.*

b. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: *The HSM-H and ISFSI shall be checked to verify that this specification has been met after the DSC is placed into storage and the HSM-H door is closed.*

Basis: *The basis for this limit is the shielding analysis presented in Appendix P of the FSAR. The specified dose rates provide as-low-as-is-reasonably-achievable on-site and off-site doses in accordance with 10 CFR Part 20 and 10 CFR 72.104(a).*

1.2.7d HSM or HSM-H Dose Rates with a Loaded 24PTH-S-LC DSC Only

Limit/Specification:

Peak dose rates at the following locations shall be limited to levels which are less than or equal to:

a. 500 mrem/hr on the HSM or HSM-H front surface.

b. 70 mrem/hr on the HSM or HSM-H door centerline.

c. 300 mrem/hr on the end shield wall exterior.

Applicability: *This specification is applicable to all HSMs or HSM-Hs which contain a loaded 24PTH-S-LC DSC.*

Objective: *The peak dose rate is limited to this value to ensure that the cask (DSC) has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable (ALARA) at locations on the HSMs or HSM-Hs where surveillance is performed, and to reduce off-site exposures during storage.*

Action:

a. If specified dose rates are exceeded, the following actions should be taken:

1. *Ensure that the DSC is properly positioned on the support rails.*
2. *Ensure proper installation of the HSM or HSM-H door.*
3. *Confirm that the spent fuel assemblies contained in the DSC conform to the specifications of Section 1.2.1.*
4. *Install temporary or permanent shielding to mitigate the dose to acceptable levels in accordance with 10 CFR Part 20, 10 CFR 72.104(a), and ALARA.*

b. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: *The HSM or HSM-H and ISFSI shall be checked to verify that this specification has been met after the DSC is placed into storage and the HSM or HSM-H door is closed.*

Basis: *The basis for this limit is the shielding analysis presented in Appendix P of the FSAR. The specified dose rates provide as-low-as-is-reasonably-achievable on-site and off-site doses in accordance with 10 CFR Part 20 and 10 CFR 72.104(a).*

1.2.8 HSM Maximum Air Exit Temperature with a Loaded 24P, 52B, 61BT, 32PT, 24PHB *or 24PTH-S-LC Only*

Limit/Specification:

Following initial DSC transfer to the HSM or the occurrence of accident conditions, the equilibrium air temperature difference between ambient temperature and the vent outlet temperature shall not exceed 100°F for ≥5 year cooled fuel, when fully loaded with 24 kW heat.

Applicability: This specification is applicable to all HSMs stored in the ISFSI. If a DSC is placed in the HSM with a heat load less than 24 kW, the limiting difference between outlet and ambient temperatures shall be determined by a calculation performed by the user using the same methodology and inputs documents in the FSAR and SER.

Objective: The objective of this limit is to ensure that the temperatures of the fuel cladding and the HSM concrete do not exceed the temperatures calculated in Section 8 of the FSAR. That section shows that if the air outlet temperature difference is less than or equal to 100°F (with a thermal heat load of 24 kW), the fuel cladding and concrete will be below the respective temperature limits for normal long-term operation.

Action: If the temperature rise is greater than that specified, then the air inlets and exits should be checked for blockage. If the blockage is cleared and the temperature is still greater than that specified, the DSC and HSM cavity may be inspected using video equipment or other suitable means. If environmental factors can be ruled out as the cause of excessive temperatures, then the fuel bundles are producing heat at a rate higher than the upper limit specified in *the Specification of Section 1.2.1* and will require additional measurements and analysis to assess the actual performance of the system. If excessive temperatures cause the system to perform in an unacceptable manner and/or the temperatures cannot be controlled to acceptable limits, then the cask shall be unloaded within the time period as determined by the analysis.

Surveillance: The temperature rise shall be measured and recorded daily following DSC insertion until equilibrium temperature is reached, 24 hours after insertion, and again on a daily basis after insertion into the HSM or following the occurrence of accident conditions. If the temperature rise is within the specifications or the calculated value for a heat load less than 24 kW, then the HSM and DSC are performing as designed to meet this specification and no further maximum air exit temperature measurements are required. Air temperatures must be measured in such a manner as to obtain representative values of inlet and outlet air temperatures.

Basis: The specified temperature rise is selected to ensure the fuel clad and concrete temperatures are maintained at or below acceptable long-term storage limits.

1.2.8a HSM-H Maximum Air Exit Temperature with a Loaded 24PTH DSC

Limit/Specification:

Following initial DSC transfer to the HSM-H or the occurrence of accident conditions, the equilibrium air temperature difference between ambient temperature and the vent outlet temperature shall not exceed 100°F when fully loaded with 40.8 kW heat for 24PTH-S or 24PTH-L DSC (or 70°F when fully loaded with 24PTH-S-LC DSC).

Applicability: *This specification is applicable to all HSM-H modules stored in the ISFSI. If a DSC is placed in the HSM-H with a heat load less than 40.8 kW, the limiting difference between outlet and ambient temperatures shall be determined by a calculation performed by the user using the same methodology and inputs documents in Appendix P of the FSAR.*

Objective: *The objective of this limit is to ensure that the temperatures of the fuel cladding and the HSM-H concrete do not exceed the temperatures calculated in Appendix P of the FSAR. That section shows that if the air outlet temperature difference is less than or equal to 100°F with a thermal heat load of 40.8 kW for 24PTH-S or 24PTH-L DSC (or 70°F with a thermal heat load of 24.0 kW for 24PTH-S-LC), the fuel cladding and concrete will be below the respective temperature limits for normal long-term operation.*

Action: *If the temperature rise is greater than that specified, then the air inlets and exits should be checked for blockage. If the blockage is cleared and the temperature is still greater than that specified, the DSC and HSM-H cavity may be inspected using video equipment or other suitable means. If environmental factors can be ruled out as the cause of excessive temperatures, then the fuel bundles are producing heat at a rate higher than the upper limit specified in the specification of Section 1.2.1 and will require additional measurements and analysis to assess the actual performance of the system. If excessive temperatures cause the system to perform in an unacceptable manner and/or the temperatures cannot be controlled to acceptable limits, then the cask shall be unloaded within the time period as determined by the analysis.*

Surveillance: *The temperature rise shall be measured and recorded daily following DSC insertion until equilibrium temperature is reached, 24 hours after insertion, and again on a daily basis after insertion into the HSM-H or following the occurrence of accident conditions. If the temperature rise is within the specifications or the calculated value for a heat load less than 40.8 kW for 24PTH-S or 24PTH-L DSC (or 24.0 kW for 24PTH-S-LC DSC) then the HSM-H and DSC are performing as designed to meet this specification and no further maximum air exit temperature measurements are required. Air temperatures must be measured in such a manner as to obtain representative values of inlet and outlet air temperatures.*

Basis: *The specified temperature rise is selected to ensure the fuel clad and concrete temperatures are maintained at or below acceptable long-term storage limits.*

1.2.9 Transfer Cask Alignment with HSM *or HSM-H*

Limit/Specification:

The cask must be aligned with respect to the HSM *or HSM-H* that the longitudinal centerline of the DSC in the transfer cask is within ±1/8 inch of its true position when the cask is docked with the HSM front access opening.

Applicability: This specification is applicable during the insertion and retrieval of all DSCs.

Objective: To ensure smooth transfer of the DSC from the transfer cask to HSM *or HSM-H* and back.

Action: If the alignment tolerance is exceeded, the following actions should be taken:

a. Confirm that the transfer system is properly configured.

b. Check and repair the alignment equipment.

c. Confirm the locations of the alignment targets on the transfer cask and HSM *or HSM-H.*

Surveillance: Before initiating DSC insertion or retrieval, confirm the alignment. Observe the transfer system during DSC insertion or retrieval to ensure that motion or excessive vibration does not occur.

Basis: The basis for the true position alignment tolerance is the clearance between the DSC shell, the transfer cask cavity, the HSM or *HSM-H* access opening, and the DSC support rails inside the HSM *or HSM-H.*

1.2.10 DSC Handling Height Outside the Spent Fuel Pool Building

Limit/Specification:

1. The loaded TC/DSC shall not be handled at a height greater than 80 inches outside the spent fuel pool building.

2. In the event of a drop of a loaded TC/DSC from a height greater than 15 inches: (a) fuel in the DSC shall be returned to the reactor spent fuel pool; (b) the DSC shall be removed from service and evaluated for further use; and (c) the TC shall be inspected for damage and evaluated for further use.

Applicability: The specification applies to handling the TC, loaded with the DSC, on route to, and at, the storage pad.

Objective:

1. To preclude a loaded TC/DSC drop from a height greater than 80 inches.

2. To maintain spent fuel integrity, according to the spent fuel specification for storage, continued confinement integrity, and DSC functional capability, after a tip-over or drop of a loaded DSC from a height greater than 15 inches.

Surveillance: In the event of a loaded TC/DSC drop accident, the system will be returned to the reactor fuel handling building, where, after the fuel has been returned to the spent fuel pool, the DSC and TC will be inspected and for future use.

Basis: The NRC evaluation of the TC/DSC drop analysis concurred that drops up to 80 inches, of the DSC inside the TC, can be sustained without breaching the confinement boundary, preventing removal of spent fuel assemblies, or causing a criticality accident. This specification ensures that handling height limits will not be exceeded in transit to, or at the storage pad. Acceptable damage may occur to the TC, DSC, and the fuel stored in the DSC, for drops of height greater than 15 inches. The specification requiring inspection of the DSC and fuel following a drop of 15 inches or greater ensures that the spent fuel will continue to meet the requirements for storage, the DSC will continue to provide confinement, and the TC will continue to provide its design functions of DSC transfer and shielding.

1.2.11 Transfer Cask Dose Rates with a Loaded 24P, 52B, 61BT, or 32PT DSC

Limit/Specification:

Dose rates from the transfer cask shall be limited to levels which are less than or equal to:

a. 200 mrem/hr at 3 feet with water in the DSC cavity.

b. 500 mrem/hr at 3 feet without water in the DSC cavity.

Applicability: This specification is applicable to the transfer cask containing a loaded 24P, 52B, 61BT, or 32PT DSC.

Objective: The dose rate is limited to this value to ensure that the DSC has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable during DSC transfer operations.

Action: If specified dose rates are exceeded, place temporary shielding around affected areas of transfer cask and review the plant records of the fuel assemblies which have been placed in DSC to ensure they conform to the fuel specifications of Section 1.2.1. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: The dose rates should be measured as soon as possible after the transfer cask is removed from the spent fuel pool.

Basis: The basis for this limit is the shielding analysis presented in Section 7.0, Appendix J, Appendix K and Appendix M of the FSAR.

1.2.11a Transfer Cask Dose Rates with a Loaded 24PHB DSC

Limit/Specification:

Dose rates from the transfer cask shall be limited to levels which are less than or equal to:

a. 1700 mrem/hr at 3 feet from the top of the Cask at the cover plate edge with water in the DSC cavity.

b. 500 mrem/hr at 3 feet radially from the Cask surface without water in the DSC cavity.

Applicability: This specification is applicable to the transfer cask containing a loaded 24PHB DSC.

Objective: The dose rate is limited to this value to ensure that the DSC has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable during DSC transfer operations.

Action: If specified dose rates are exceeded, place temporary shielding around affected areas of transfer cask and review the plant records of the fuel assemblies which have been placed in DSC to ensure they conform to the fuel specifications of Section 1.2.1. Submit a letter report to the NRC within 30 days summarizing the action 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.

Surveillance: The dose rates should be measured as soon as possible after the transfer cask is removed from the spent fuel pool.

Basis: The basis for this limit is the shielding analysis presented in Appendix N of the FSAR.

1.2.11b Transfer Cask Dose Rates with a Loaded 24PTH-S or 24PTH-L DSC

Limit/Specification:

Dose rates from the transfer cask shall be limited to levels which are less than or equal to:

a. 500 mrem/hr at 3 feet from the top of the Cask at the cover plate edge with water in the DSC cavity.

b. 600 mrem/hr at 3 feet radially from the Cask surface without water in the DSC cavity.

Applicability: *This specification is applicable to the transfer cask containing a loaded 24PTH-S or 24PTH-L DSC.*

Objective: *The dose rate is limited to this value to ensure that the DSC has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable during DSC transfer operations.*

Action: *If specified dose rates are exceeded, place temporary shielding around affected areas of transfer cask and review the plant records of the fuel assemblies which have been placed in DSC to ensure they conform to the fuel specifications of Section 1.2.1. Submit a letter report to the NRC within 30 days summarizing the action 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.*

Surveillance: *The dose rates should be measured as soon as possible after the transfer cask is removed from the spent fuel pool.*

Basis: *The basis for this limit is the shielding analysis presented in Appendix P of the FSAR.*

1.2.11c Transfer Cask Dose Rates with a Loaded 24PTH-S-LC DSC

Limit/Specification:

Dose rates from the transfer cask shall be limited to levels which are less than or equal to:

a. 20 mrem/hr at 3 feet from the top of the Cask at the cover plate edge with water in the DSC cavity.

b. 250 mrem/hr at 3 feet radially from the Cask surface without water in the DSC cavity.

Applicability: *This specification is applicable to the transfer cask containing a loaded 24PTH-S-LC DSC.*

Objective: *The dose rate is limited to this value to ensure that the DSC has not been inadvertently loaded with fuel not meeting the specifications in Section 1.2.1 and to maintain dose rates as-low-as-is-reasonably achievable during DSC transfer operations.*

Action: *If specified dose rates are exceeded, place temporary shielding around affected areas of transfer cask and review the plant records of the fuel assemblies which have been placed in DSC to ensure they conform to the fuel specifications of Section 1.2.1. Submit a letter report to the NRC within 30 days summarizing the action 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.*

Surveillance: *The dose rates should be measured as soon as possible after the transfer cask is removed from the spent fuel pool.*

Basis: *The basis for this limit is the shielding analysis presented in Appendix P of the FSAR.*

1.2.12 Maximum DSC Removable Surface Contamination

Limit/Specification:

2,200 dpm/100 cm^2 for beta-gamma sources
220 dpm/100 cm^2 for alpha sources.

Applicability: This specification is applicable to all DSCs.

Objective: To ensure that release of non-fixed contamination above accepted limits does not occur.

Action:If the required limits are not met:

a. Flush the DSC/transfer cask annulus with demineralized water and repeat surface contamination surveys of the DSC upper surface.

b. If contamination of the DSC cannot be reduced to an acceptable level by this means, direct surface cleaning techniques shall be used following removal of the fuel assemblies from the DSC and removal of the DSC from the transfer cask.

c. Check and replace the DSC/transfer cask annulus seal to ensure proper installation and repeat canister loading process.

Surveillance: Following placement of each loaded DSC/transfer cask into the cask decontamination area, fuel pool water above the top shield plug shall be removed and the top region of the DSC and cask shall be decontaminated. A contamination survey of the upper 1 foot of the DSC shall be taken.

Basis: This non-fixed contamination level is consistent with the requirements of 10 CFR 71.87(i)(1) and 49 CFR 173.443, which regulate the use of spent fuel shipping containers. Consequently, these contamination levels are considered acceptable for exposure to the general environment. This level will also ensure that contamination levels of the inner surfaces of the HSM and potential releases of radioactive material to the environment are minimized.

1.2.13 TC/DSC Lifting Heights as a Function of Low Temperature and Location

Limit/Specification:

1. No lifts or handling of the TC/DSC at any height are permissible at DSC basket temperatures below -20°F inside the spent fuel pool building.

2. 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 spent fuel pool building.

3. No lift height restriction is imposed on the TC/DSC if the basket temperature is higher than 0°F inside the spent fuel pool building.

4. The maximum lift height and handling height for all transfer operations outside the spent fuel pool building shall be 80 inches and the basket temperature may not be lower than 0°F.

Applicability: These temperature and height limits apply to lifting and transfer of all loaded TC/DSCs inside and outside the spent fuel pool building.

The requirements of 10 CFR Part 72 apply outside the spent fuel building. The requirements of 10 CFR Part 50 apply inside the spent fuel pool building.

Objective: The low temperature and height limits are imposed to ensure that brittle fracture of the ferritic steels, used in the TC trunnions and shell and in the DSC basket, does not occur during transfer operations.

Action: Confirm the basket temperature before transfer of the TC. If calculation or measurement of this value is available, then the ambient temperature may conservatively be used.

Surveillance: The ambient temperature shall be measured before transfer of the TC/DSC.

Bases: The basis for the low temperature and height limits is ANSI N14.6-1986 paragraph 4.2.6 which requires at least 40°F higher service temperature than nil ductility transition (NDT) temperature for the TC. In the case of the standardized TC, the test temperature is -40°F; therefore, although the NDT temperature is not determined, the material will have the required 40°F margin if the ambient temperature is 0°F or higher. This assumes the material service temperature is equal to the ambient temperature.

The basis for the low temperature limit for the DSC is NUREG/CR-1815. The basis for the handling height limits is the NRC evaluation of the structural integrity of the DSC to drop heights of 80 inches and less.

1.2.14 TC/DSC Transfer Operations at High Ambient Temperatures

Limit/Specification:

1. The ambient temperature for transfer operations of a loaded TC/DSC shall not be greater that 100°F (when cask is exposed to direct insolation).

2. For transfer operations when ambient temperatures exceed 100°F, a solar shield shall be used to provide protection against direct solar radiation.

Applicability: This ambient temperature limit applies to all transfer operations of loaded TC/DSCs outside the spent fuel pool building.

Objective: The high temperature limit (100°F) is imposed to ensure that:

1. The fuel cladding temperature limit is not exceeded,

2. The solid neutron shield material temperature limit is not exceeded, and

3. The corresponding TC cavity pressure limit is not exceeded.

Action: Confirm what the ambient temperature is and provide appropriate solar shade if ambient temperature is expected to exceed 100°F.

Surveillance: The ambient temperature shall be measured before transfer of the TC/DSC.

Bases: For the NUHOMS®-24P, 52B and 61BT systems, the basis for the high temperature limit is PNL-6189 (Reference 1) for the fuel clad limit, the manufacturer's specification for neutron shield, and the design basis pressure of the TC internal cavity pressure. For the NUHOMS®-32PT, 24PHB *and 24PTH* systems, the fuel cladding limits are based on ISG-11, Revision 2 (Reference 3).

1.2.15 Boron Concentration in the DSC Cavity Water for the 24-P Design Only

Limit/Specification:

The DSC cavity shall be filled only with water having a boron concentration equal to, or greater than:

1) 2,000 ppm for fuel with an equivalent unirradiated enrichment of less than or equal to 1.45 wt. % U-235 per Figure 1-1.

2) 2,350 ppm for fuel with an equivalent unirradiated enrichment of greater than 1.45 wt. % U-235 per Figure 1-1.

Applicability: This limit applies only to the standardized NUHOMS®-24P design. No boration in the cavity water is required for the standardized NUHOMS®-52B or NUHOMS®-61BT system since that system uses fixed absorber plates.

Objective:

1) To ensure a subcritical configuration is maintained in the case of accidental loading of the DSC with unirradiated fuel.

2) To ensure a subcritical configuration is maintained in the case of loading of the DSC with fuel with an equivalent unirradiated enrichment of greater than 1.45 wt. % U-235.

Action: If the boron concentration is below the required weight percentage concentration (gm boron/10^6 gm water), add boron and re-sample, and test the concentration until the boron concentration is shown to be greater than that required.

Surveillance: Written procedures shall be used to independently determine (two samples analyzed by different individuals) the boron concentration in the water used to fill the DSC cavity.

1. Within 24 hours before insertion of the first fuel assembly into the DSC, the dissolved boron concentration in water in the spent fuel pool, and in the water that will be introduced in the DSC cavity, shall be independently determined (two samples chemically analyzed by two individuals).

2. Within 24 hours before flooding the DSC cavity for unloading the fuel assemblies, the dissolved boron concentration in water in the spent pool, and in the water that will be introduced into the DSC cavity, shall be independently determined (two samples analyzed chemically by two individuals).

3. The dissolved boron concentration in the water shall be reconfirmed at intervals not to exceed 48 hours until such time as the DSC is removed from the spent fuel pool or the fuel has been removed from the DSC.

Bases:

1) The required boron concentration is based on the criticality analysis for an accidental misloading of the DSC with unburned fuel, maximum enrichment, and optimum moderation conditions.

3) The required boron concentration is based on the criticality analysis for loading of the DSC with unirradiated fuel, maximum enrichment, and optimum moderation conditions.

1.2.15a Boron Concentration in the DSC Cavity Water for the 32PT Design Only

Limit/Specification:

The DSC cavity shall be filled only with water having a boron concentration equal to, or greater than 2500 ppm.

Applicability: This limit applies only to the standardized NUHOMS®- 32PT design.

Objective: To ensure a subcritical configuration is maintained in the case of loading of the DSC with design basis fuel.

Action: If the boron concentration is below the required weight percentage concentration (gm boron/10^6 gm water), add boron and re-sample, and test the concentration until the boron concentration is shown to be greater than that required.

Surveillance: Written procedures shall be used to independently determine (two samples analyzed by different individuals) the boron concentration in the water used to fill the DSC cavity.

1. Within 24 hours before insertion of the first fuel assembly into the DSC, the dissolved boron concentration in water in the spent fuel pool, and in the water that will be introduced in the DSC cavity, shall be independently determined (two samples chemically analyzed by two individuals).

2. Within 24 hours before flooding the DSC cavity for unloading the fuel assemblies, the dissolved boron concentration in water in the spent pool, and in the water that will be introduced into the DSC cavity, shall be independently determined (two samples analyzed chemically by two individuals).

3. The dissolved boron concentration in the water shall be reconfirmed at intervals not to exceed 48 hours until such time as the DSC is removed from the spent fuel pool or the fuel has been removed from the DSC.

Bases: The required boron concentration is based on the criticality analysis presented in Appendix M of this FSAR for loading of the DSC with unirradiated fuel, maximum enrichment, and optimum moderation conditions.

1.2.15b Boron Concentration in the DSC Cavity Water for the 24PHB Design Only

Limit/Specification:

- The DSC cavity shall be filled only with water having a boron concentration equal to, or greater than 2,350 ppm for enrichment of less than or equal to 4.0 wt. % U-235 based on the spent fuel assembly with the maximum initial enrichment in the DSC.
- The DSC cavity shall be filled only with water having a minimum boron concentration per Figure 1-10 for initial enrichment of greater than or equal to 4.0 wt. % U-235 based on the spent fuel assembly with the maximum initial enrichment in the DSC.

Applicability: This limit applies only to the standardized NUHOMS®-24PHB design.

Objective: To ensure a subcritical configuration is maintained in the case of accidental loading of the DSC with unirradiated fuel.

Action: If the boron concentration is below the required weight percentage concentration (gm boron/10^6 gm water), add boron and re-sample, and test the concentration until the boron concentration is shown to be greater than that required.

Surveillance: Written procedures shall be used to independently determine (two samples analyzed by different individuals) the boron concentration in the water used to fill the DSC cavity.

1. Within 24 hours before insertion of the first fuel assembly into the DSC, the dissolved boron concentration in water in the spent fuel pool, and in the water that will be introduced in the DSC cavity, shall be independently determined (two samples chemically analyzed by two individuals).

2. Within 24 hours before flooding the DSC cavity for unloading the fuel assemblies, the dissolved boron concentration in water in the spent pool, and in the water that will be introduced into the DSC cavity, shall be independently determined (two samples analyzed chemically by two individuals).

3. The dissolved boron concentration in the water shall be reconfirmed at intervals not to exceed 48 hours until such time as the DSC is removed from the spent fuel pool or the fuel has been removed from the DSC.

Bases: The required boron concentration is based on the criticality analysis for loading of the DSC with unirradiated fuel, initial enrichment, and optimum moderation conditions.

1.2.15c Boron Concentration in the DSC Cavity Water for the 24PTH Design Only

Limit/Specification:

- *The DSC cavity shall only be filled with water having a minimum boron concentration which meets the requirements of Table 1-1p, when loading intact fuel. Table 1-1p lists the minimum soluble boron concentration as a function of the fuel assembly class, DSC basket type and the corresponding assembly average initial enrichment values.*
- *The DSC cavity shall only be filled with water having a minimum boron concentration which meets the requirements of Table 1-1q, when loading damaged fuel. Table 1-1q lists the minimum soluble boron concentration as a function of the fuel assembly class, DSC basket type, the maximum number of damaged fuel assemblies allowed and the corresponding maximum assembly average initial enrichment values.*

Applicability: *This limit applies only to the* NUHOMS®*-24PTH design.*

Objective: *To ensure a subcritical configuration is maintained in the case of accidental loading of the DSC with unirradiated fuel.*

Action: *If the boron concentration is below the required weight percentage concentration (gm boron/10^6 gm water), add boron and re-sample, and test the concentration until the boron concentration is shown to be greater than that required.*

Surveillance: *Written procedures shall be used to independently determine (two samples analyzed by different individuals) the boron concentration in the water used to fill the DSC cavity.*

1. *Within 24 hours before insertion of the first fuel assembly into the DSC, the dissolved boron concentration in water in the spent fuel pool, and in the water that will be introduced in the DSC cavity, shall be independently determined (two samples chemically analyzed by two individuals).*

2. *Within 24 hours before flooding the DSC cavity for unloading the fuel assemblies, the dissolved boron concentration in water in the spent pool, and in the water that will be introduced into the DSC cavity, shall be independently determined (two samples analyzed chemically by two individuals).*

3. *The dissolved boron concentration in the water shall be reconfirmed at intervals not to exceed 48 hours until such time as the DSC is removed from the spent fuel pool or the fuel has been removed from the DSC.*

Bases: *The required boron concentration is based on the criticality analysis in FSAR Appendix P for loading of the DSC with unirradiated fuel, initial enrichment, and optimum moderation conditions.*

1.2.16 Provision of TC Seismic Restraint Inside the Spent Fuel Pool Building as a Function of Horizontal Acceleration and Loaded Cask Weight

Limit/Specification:

Seismic restraints shall be provided to prevent overturning of a loaded TC during a seismic event if a certificate holder determines that the horizontal acceleration is 0.40 g or greater. The determination of horizontal acceleration acting at the center of gravity (CG) of the loaded TC must be based on a peak horizontal ground acceleration at the site, but shall not exceed 0.25 g.

Applicability: This condition applies to all TCs which are subject to horizontal accelerations of 0.40 g or greater.

Objective: To prevent overturning of a loaded TC inside the spent fuel pool building.

Action: Determine what the horizontal acceleration is for the TC and determine if the cask weight is less than 190 kips.

Surveillance: Determine need for TC restraint before any operations inside the spent fuel pool building.

Bases: Calculation of overturning and restoring moments.

1.2.17 61BT DSC Vacuum Drying Duration Limit

Limit/Specifications:

Time limit for duration of Vacuum Drying is 96 hours after completion of 61BT DSC draining.

Applicability: This specification is only applicable to a 61BT DSC with greater than 17.6 kW heat load.

Objective: To ensure that 61BT DSC basket structure does not exceed 800°F.

Action:

1. If the DSC vacuum drying pressure limit of Technical Specification 1.2.2 cannot be achieved at 72 hours after completion of DSC draining, the DSC must be backfilled with 0.1 atm or greater helium pressure within 24 hours.

2. Determine the cause of failure to achieve the vacuum drying pressure limit as defined in Technical Specification 1.2.2.

3. Initiate vacuum drying after actions in Step 2 are completed or unload the DSC within 30 days.

Surveillance: No maintenance or tests are required during the normal storage. Monitoring of the time duration during the vacuum drying operation is required .

Bases: The time limit of 96 hours was selected to ensure that the temperature within the DSC is within the design limits during vacuum drying.

1.2.17a 32PT DSC Vacuum Drying Duration Limit

Limit/Specifications:

1. The limit for duration of Vacuum Drying is 31 hrs for a 32PT DSC with a heat load greater than 8.4 kW and up to 24 kW after initiation of vacuum drying.
2. The limit for duration of Vacuum Drying is 36 hrs for a 32PT DSC with a heat load of up to 8.4 kW after initiation of vacuum drying.

Applicability: This specification is applicable to a 32PT DSC with heat load as described above.

Objective: To ensure the fuel cladding temperature in the 32PT DSC does not exceed 752°F during drying and also to meet the thermal cycling limit of 117°F during drying, helium backfilling and transfer operations.

Action:

1. If the DSC vacuum drying pressure limit of Technical Specification 1.2.2 cannot be achieved at the specified time limits after initiation of vacuum drying, the DSC must be backfilled with 0.1 atm or greater helium pressure within 2 hours.
2. Determine the cause of failure to achieve the vacuum drying pressure limit as defined in Technical Specification 1.2.2.
3. Initiate vacuum drying after actions in Step 2 are completed or unload the DSC within 30 days.

Surveillance: No maintenance or tests are required during the normal storage. Monitoring of the time duration during the vacuum drying operation is required.

Bases: The time limits for the 32PT DSC were selected to ensure that the maximum cladding temperature is within the acceptable limit of 752°F during vacuum drying. These time limits also ensure that the cladding temperature meets the thermal cycling criteria of 117°F during drying, helium backfilling and transfer operations.

1.2.17b 24PHB DSC Vacuum Drying Duration Limit

Limit/Specifications:

1. The limit for duration of Vacuum Drying is 29 hrs for a 24PHB DSC with a heat load greater than 12.0 kW and up to 24 kW after initiation of vacuum drying.
2. The limit for duration of Vacuum Drying is 32 hrs for a 24PHB DSC with a heat load of up to 12.0 kW after initiation of vacuum during.

Applicability: This specification is applicable to a 24PHB DSC with heat load as described above.

Objective: To ensure the fuel cladding temperature in the 24PHB DSC does not exceed 752°F during drying and also to meet the thermal cycling limit of 117°F during drying, helium backfilling and transfer operations.

Action:

1. If the DSC vacuum drying pressure limit of Technical Specification 1.2.2 cannot be achieved at the specified time limits after initiation of vacuum drying, the DSC must be backfilled with 0.1 atm or greater helium pressure within 2 hours.

2. Determine the cause of failure to achieve the vacuum drying pressure limit as defined in Technical Specification 1.2.2.

3. Initiate vacuum drying after actions in Step 2 are completed or unload the DSC within 30 days.

Surveillance: No maintenance or tests are required during the normal storage. Monitoring of the time duration during the vacuum drying operation is required.

Bases: The time limit for the 24PHB DSC were selected to ensure that the maximum cladding temperature is within the acceptable limits of 752°F during vacuum drying. These time limits also ensure that the cladding temperature meets the thermal cycling criteria of 117°F during drying, helium backfilling and transfer operations.

1.2.17c 24PTH DSC Vacuum Drying Duration Limit

Limit/Specifications:

1. *The time duration of Vacuum Drying for a 24PTH DSC following blowdown completion using air or nitrogen shall be less than or equal to:*

- *17 hours for Heat Load Configuration No.1, 2 and 3*
- *23 hours for Heat Load Configuration No. 4*
- *26 hours for Heat Load Configuration No. 5*

2. *No time limits apply for vacuum drying of 24PTH DSC if helium is used for blowdown.*

Applicability: *This specification is applicable to a 24PTH DSC with heat load configuration following blowdown using air or nitrogen as described above.*

Objective: *To ensure the fuel cladding temperature in the 24PTH DSC does not exceed 752°F during drying and also to meet the thermal cycling limit of 117°F during drying, helium backfilling and transfer operations.*

Action:

1. *If the DSC vacuum drying pressure limit of Technical Specification 1.2.2 cannot be achieved at the specified time limits after initiation of vacuum drying, the DSC must be backfilled with 0.1 atm or greater helium pressure within 2 hours.*
2. *Determine the cause of failure to achieve the vacuum drying pressure limit as defined in Technical Specification 1.2.2.*
3. *Initiate vacuum drying after actions in Step 2 are completed or unload the DSC within 30 days.*

Surveillance: *No maintenance or tests are required during the normal storage. Monitoring of the time duration during the vacuum drying operation is required.*

Bases: *The time limit for the 24PTH DSC were selected to ensure that the maximum cladding temperature is within the acceptable limits of 752°F during vacuum drying. These time limits also ensure that the cladding temperature meets the thermal cycling criteria of 117°F during drying, helium backfilling and transfer operations.*

1.2.18 Time Limit for Completion of 24PTH DSC Transfer Operation

Limit Specification:

The time limit for completion of transfer of a loaded and welded 24PTH DSC with a heat load greater than 24.0 kW from the cask handling area to the HSM-H is dependent on the heat load as follows:

- *9.5 hours for a DSC with a heat load greater than 31.2 kW but less than or equal to 40.8 kW with basket types 1A, 1B or 1C.*
- *25 hours for a DSC with a heat load greater than 24.0 kW but less than or equal to 31.2 kW with a basket type 2A, 2B or 2C (without aluminum inserts).*
- *No time limits apply for a 24PTH DSC with a heat load greater than 24.0 kW but less than or equal to 31.2 kW, with a basket type 1A, 1B, or 1C (with aluminum inserts).*

Applicability: *This specification is only applicable to a 24PTH-S or 24PTH-L DSC when transferred in OS197FC cask with heat loads greater than 24.0 kW. The time limit is defined as the time elapsed after the initiation of draining of Cask/DSC annulus water and bolting of the transfer cask top cover plate until it is unbolted for insertion of the DSC into the HSM-H.*

Objective: *To ensure that the fuel cladding temperatures in the 24PTH DSC do not exceed 752°F during transfer operations.*

Actions: *Initiate one of the following corrective actions within two hours if specified time limits are exceeded.*

1. *Complete the transfer of the DSC from the transfer cask to the HSM-H, or*
2. *If the transfer cask is in the cask handling area in a vertical orientation, unbolt the cask top cover plate and fill the cask/DSC annulus with clean water, or*
3. *If the cask is in a horizontal orientation on the transfer skid, then initiate air circulation in the Cask/DSC annulus by starting one of the blowers provided on the cask transfer skid, or*
4. *Initiate appropriate external cooling of the cask outer surface by other means to limit the temperature increase or return the cask to the cask handling area, unbolt the cask top cover plate and fill the cask/DSC annulus with clean water.*

Surveillance: *Monitoring of the time duration following the completion of the DSC sealing until the completion of unbolting of the transfer cask top plate is required.*

Bases: *The required time limit is based on the transient thermal analysis presented in Appendix P of the FSAR for the transfer of the 24PTH DSC.*

1.3 Surveillance and Monitoring

One of the two alternate surveillance activities listed below (1.3.1 or 1.3.2) shall be performed for monitoring the HSM or HSM-H thermal performance.

1.3.1 Visual Inspection of HSM *or HSM-H* Air Inlets and Outlets (Front Wall and Roof Birdscreen)

Limit/Surveillance:

A visual surveillance of the exterior of the air inlets and outlets shall be conducted daily. In addition, a close-up inspection shall be performed to ensure that no materials accumulate between the modules to block the air flow.

Objective: To ensure that HSM *or HSM-H* air inlets and outlets are not blocked for more than 40 hours to prevent exceeding the allowable HSM *or HSM-H* concrete and or the fuel cladding temperatures.

Applicability: This specification is applicable to all HSMs *or HSM-Hs* loaded with a DSC loaded with spent fuel.

Action: If the surveillance shows blockage of air vents (inlets or outlets), they shall be cleared. If the screen is damaged, it shall be replaced.

Basis: The concrete temperature could exceed 350°F in the accident circumstances of complete blockage of all vents if the period exceeds approximately 40 hours *for HSM*. Concrete temperatures over 350°F in accidents (without the presence of water or steam) can have uncertain impact on concrete strength and durability. A conservative analysis (adiabatic heat case) of complete blockage of all air inlets or outlets indicates that the concrete can reach the accident temperature limit of 350°F in the time periods specified *for HSM. For HSM-H, the time period specified ensures that blockage will not exist for periods longer than that assumed in the Safety analysis presented in Appendix P of the FSAR.* At the 40 hour time limit, the fuel cladding temperature remains well below the accident limit of 1058°F.

1.3.2 HSM *or HSM-H* Thermal Performance

Surveillance: Verify a temperature measurement of the thermal performance, for each HSM *or HSM-H*, 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.

Action: If the temperature measurement shows a significant unexplained difference, so as to indicate the approach of materials to the concrete or fuel clad temperature criteria, take appropriate action to determine the cause and return the canister to normal operation. If the measurement or other evidence suggests that the concrete accident temperature criteria (350°F) has been exceeded for more than 24 hours, the HSM *or HSM-H* must be removed from service unless the licensee can provide 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.

Basis: The temperature measurement should be of sufficient scope to provide the licensee with a positive means to identify conditions which threaten to approach temperature criteria for proper HSM *or HSM-H* operation and allow for the correction of off-normal thermal conditions that could lend to exceeding the concrete and fuel clad temperature criteria.

Table 1.3.1
Summary of Surveillance and Monitoring Requirements

Surveillance or Monitoring	Period	Reference Section
1. Fuel Specification	PL	1.2.1
2. DSC Vacuum Pressure During Drying	L	1.2.2
3. DSC Helium Backfill Pressure	L	1.2.3 or 1.2.3a
4. DSC Helium Leak Rate of Inner Seal Weld	L	1.2.4 or 1.2.4a
5. DSC Dye Penetrant Test of Closure Welds	L	1.2.5
6. DELETED	-	-
7. HSM *or HSM-H* Dose Rates	L	1.2.7 or 1.2.7a, or 1.2.7b *or 1.2.7c or 1.2.7d*
8. HSM *or HSM-H* Maximum Air Exit Temperature	24 hrs	1.2.8 *or 1.2.8a*
9. TC Alignment with HSM *or HSM-H*	S	1.2.9
10. DSC Handling Height Outside Spent Fuel Pool Building	AN	1.2.10
11. Transfer Cask Dose Rates	L	1.2.11 or 1.2.11a *or 1.2.11b or 1.2.11c*
12. Maximum DSC Removable Surface Contamination	L	1.2.12
13. TC/DSC Lifting Heights as a Function of Low Temperature and Location	L	1.2.13
14. TC/DSC Transfer Operations at High Ambient Temperatures	L	1.2.14
15. Boron Concentration in DSC Cavity Water	PL	1.2.15, or 1.2.15a, or 1.2.15b *or 1.2.15c*
16. Provision of TC Seismic Restraint Inside the Spent Fuel Pool Building as a Function of Horizontal Acceleration and Loaded Cask Weight	PL	1.2.16
17. Vacuum Drying Duration Limits	L	1.2.17 or 1.2.17a, or 1.2.17b, *or 1.2.17c*
18. 24PTH DSC Transfer Time	*L*	*1.2.18*
19. Visual Inspection of HSM *or HSM-H* Air Inlets and Outlets *or HSM or HSM-H Thermal Performance*	D	1.3.1 *or 1.3.2*

<u>LEGEND</u>
PL.............. Prior to Loading
L................ During loading and prior to movement to HSM *or HSM-H* pad
24 hrs......... Time following DSC insertion to HSM *or HSM-H*
S .... Prior to movement of DSC to or from HSM *or HSM-H*
AN............. As necessary
D................ Daily (24 hour frequency)

References

1. Levy, I.S., et al., "Recommended Temperature Limits for Dry Storage of Spent Light Water Reactor Zircaloy-Clad Fuel Rods in Inert Gas," Pacific Northwest Laboratory Report, PNL-6189, May 1987.

2. Johnson, A.B., Jr., and E.R. Gilbert, "Technical Basis for Storage of Zircaloy-Clad Spent Fuel in Inert Gases," PNL-4835, September 1983.

3. Interim Staff guidance No. 11, Revision 2, "Cladding Considerations for the Transportation and Storage of Spent Fuel," July 30, 2002.

ATTACHMENT C

NUHOMS® FSAR Revision 6 Changed Pages

Listed below are the affected NUHOMS® FSAR Revision 6 pages due to the addition of the NUHOMS®-24PTH System to the Standardized NUHOMS System:

- Page 1.1-2
- Page 1.1-3a (New Page)
- Page 1.1-3
- New Appendix P (Chapters P1 through P.14)

Amendment No. 3 to CoC 1004, approved on September 12, 2001, authorizes the addition of the NUHOMS®-61BT DSC to the standardized NUHOMS® system. The NUHOMS®-61BT DSC is designed to store 61 intact BWR fuel assemblies and meets the storage and transportation requirements of 10CFR72 and 10CFR71, respectively. A detailed description of the authorized contents and supporting safety analyses for this system are provided in Appendix K.

TN has added NUHOMS®-24PT2 DSC to the standardized NUHOMS® system. The NUHOMS®-24PT2 DSC is a modified version of the NUHOMS®-24P DSC, designed to store 24 intact PWR fuel assemblies with or without BPRAs. This DSC meets the storage and transportation requirements of 10CFR72 (CoC 1004) and 10CFR71 (CoC 9255), respectively. A detailed description of the authorized contents and supporting safety analyses for this system are provided in Appendix L.

Revision 6 adds enhanced versions of the standardized HSM and transfer cask, designated as HSM Model 102 and OS197H, respectively, to the standardized NUHOMS® system.

Appendix B has been revised to include a validation of the fuel effective conductivity values used in the standardized NUHOMS® thermal analysis against the NUHOMS®-7P test data.

Amendment No. 8 to CoC 1004 adds NUHOMS®-24PTH system to the standardized NUHOMS® system. The NUHOMS®-24PTH system is designed to store a total of 24 intact (or up to 12 damaged and balance intact) PWR fuel assemblies with a maximum assembly average initial enrichment of 5.0 wt. % U-235, a maximum assembly average burn up of 62 GWd/MTU, and a minimum cooling time of 3.0 years. Five heat load zoning configurations are authorized and the system is designed to accommodate a decay heat load of up to 40.8 kW per DSC depending upon the specific configuration selected.

The NUHOMS®-24PTH system adds a new canister with three alternate configurations (designated as DSC Type 24PTH-S, -24PTH-L, or -24PTH-S-LC), a new module designated as HSM-H, and a modified version of OS197/OS197H transfer cask designated as OS197FC.

A general description of the 24PTH system, including drawings, authorized payload contents and supporting safety analyses for this system are provided in Appendix P of the FSAR.

The remainder of this chapter provides a general overview of the standardized NUHOMS® system and summarizes the contents of this FSAR.

1.1 Introduction

Chapters 1 through 8 and Appendices A through J of this FSAR provide the supporting licensing basis for the standardized NUHOMS®-24P and -52B systems only. Appendix K of this document addresses the addition of NUHOMS®-61BT DSC to the standardized NUHOMS® system.

Following the docketing of Revision 6 of this FSAR, TN has submitted additional applications for amending CoC 1004 to enhance the capabilities of the standardized NUHOMS® system. These applications have either been approved or are currently in final rulemaking. A complete description of the new systems addressed by these amendments including supporting safety analysis are located within self contained Appendices to this FSAR as summarized in the following Table: .

Amendment No	***Description***	***Location of Supporting Licensing Basis***
4	*Addition of low burn up fuel to the contents of the NUHOMS-24P DSC.*	*Chapter 3*
5	*Addition of the 32PT DSC to the Standardized NUHOMS system.*	*M*
6	*Addition of the 24PHB DSC to the Standardized NUHOMS system.*	*N*
7	*Addition of damaged fuel to the contents of the 61BT DSC.*	*K*

Due to the unavailability of nuclear fuel reprocessing or a permanent geologic repository in the United States (U.S.), long-term storage of spent fuel assemblies (SFAs) has become necessary. To date, storage systems have, to a large extent, relied on the plant's spent fuel pools. However, as existing pools have begun to approach their capacity (with high-density storage racks), out-of-pool dry storage system designs have emerged. NUHOMS® is a proven system for dry storage which has been in use at reactor sites since March of 1989.

Figure 1.1-1, Figure 1.1-2 and Figure 1.1-3 show the primary components and arrangement of an ISFSI utilizing the NUHOMS® system. The SFAs are loaded into the DSC (which is placed inside the transfer cask) in the fuel pool at the reactor site. The transfer cask containing the loaded DSC is removed from the pool and placed in the cask decon area where sealing, draining, and drying operations are performed. The DSC cavity is then backfilled with helium. Multi-layer, double seal welds at each end of the DSC and multi-layer circumferential and longitudinal welds are utilized to assure that no leakage of helium can occur. The cask is then placed on a transport trailer in the plant's fuel/reactor building and towed to the ISFSI located on-site. At the ISFSI location, the loaded transfer cask is aligned with the HSM and the DSC is pushed out of the transfer cask into the HSM using a hydraulic ram. Once inside the HSM, the DSC is in safe, passive dry storage.

The various components of the NUHOMS® system *(24P and 52B systems only)* are further described in Sections 1.2 and 1.3.

The design and the conservative generic analyses of the system components are described in detail in the remainder of this FSAR. The principal design features of a NUHOMS® ISFSI are:

1. Canisterized Spent Fuel in a Welded Containment Vessel Shielded by a Prefabricated Concrete Module

   This provides for a high integrity multiple barrier system to ensure the safe storage of spent fuel which can be easily implemented by a licensee on a timely economical basis.

2. Horizontal Transfer of the DSC into and out of the HSM

   This obviates the need for a critical heavy lift of the SFAs at the storage location (i.e. away form the plant's safety-related systems), optimizes the amount of material required for biological shielding, and results in a passive, low profile, impact-resistant storage structure. This also provides a means for canister retrieval and eventual off-site shipment in a compatible licensed shipping cask without future reliance on plant facilities.

3. Transport of the DSC from the fuel/reactor building to the HSM in a Shielded Atmospheric On-site TC

   This provides radiation shielding and structural protection for the DSC during the transfer operation while providing passive heat removal for the canisterized spent fuel.

4. Shielded End Plug Assemblies on the DSC