Appendix A.1.4.3
NUHOMS®-24PTH DSC

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Appendix A.1.4.3
NUHOMS®-24PTH DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.3.4.

A.1.4.3.1 NUHOMS®-24PTH DSC Description

Each NUHOMS®-24PTH DSC consists of a DSC shell assembly and a basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* As shown in Table A.1.4.3-1, the 24PTH DSC system consists of three design configurations as follows:

- 24PTH-S, Short Canister including "F" version
- 24PTH-L, Long Canister including "F" version
- 24PTH-S/LC, short canister with long cavity including "F" version

Table A.1.4.3-1 provides the overall lengths and outer diameters for each 24PTH DSC configuration. The shell assemblies are high integrity stainless steel welded pressure vessels that provide confinement of radioactive materials, encapsulate the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed), and provide biological shielding (in axial direction). The 24PTH DSCs have double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 24PTH DSCs. The top end closure welds are made after fuel loading. Both top plug penetrations (siphon and vent ports) are redundantly sealed after the 24PTH DSC drying operations are complete.

The canister is designed to contain its fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails attached to the inside of the aluminum inner sleeve of the transport cask.

A.1.4.3.2 NUHOMS®-24PTH DSC Fuel Basket

The basket structures are designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall lengths and diameters of the baskets for each canister configuration are provided in Table A.1.4.3-1. The details of the 24PTH fuel baskets are shown in the drawings in Section A.1.4.10.4 of Appendix A.1.4.10. The 24PTH baskets are designed to accommodate 24 intact or up to 12 damaged, with up to 8 failed fuel cans loaded with failed fuel with the remainder intact, PWR fuel assemblies with or without Control Components (CCs). The basket structure consists of a welded assembly of stainless steel tubes with the space between adjacent tubes filled with aluminum and neutron poison plates and surrounded by support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel tube assembly. The basket is laterally supported by the basket rails and the canister shell. The stainless steel and aluminum basket rails are oriented

parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

Shear keys, welded to the inner wall of the DSC, mate with notches in the basket support rails to prevent the basket from rotating during normal operations.

Aluminum and/or neutron absorbing poison plates are sandwiched between the fuel compartments. The poison plates are constructed of either borated aluminum or Metal Matrix Composites (MMCs) or Boral® that provide criticality control and together with the aluminum plates provide a heat conduction path from the fuel assemblies to the canister wall. Table A.1.4.3-6 provides the minimum B10 content as a function of basket type and poison plate material. Table A.1.4.3-7 provides the maximum allowable heat load for the various 24PTH DSC configurations for transport.

The failed fuel assemblies are to be placed in individual Failed Fuel Cans (FFCs). Each FFC is constructed of sheet metal and is provided with a welded bottom closure and a removable top closure which allows lifting of the FFC with the enclosed damaged assembly/debris. The FFC is provided with screens at the bottom and top to contain fuel debris and allow fill/drainage of water from the FFC during loading operations. The FFC is protected by the fuel compartment tubes and its only function is to confine the failed fuel.

A.1.4.3.3 NUHOMS®-24PTH DSC Contents

Each of the NUHOMS®-24PTH configurations is designed to transport intact (including reconstituted) and/or damaged and/or failed PWR fuel as specified in Table A.1.4.3-2 and Table A.1.4.3-4. The fuel to be transported is limited to a maximum assembly average initial enrichment of 5.0 wt. % U-235. The maximum allowable assembly average burnup is limited to 62 GWd/MTU and the minimum cooling time *requirements are given in Table A.1.4.3-2.* The 24PTH DSC *is* also designed to transport Control Components (CCs) with thermal and radiological characteristics as listed in Table A.1.4.3-3. The CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs), and Neutron Sources.

Partial Length Shield Assemblies (PLSAs) for the Westinghouse 15x15 class, where part of the active fuel is replaced with steel are also included as authorized contents.

Reconstituted assemblies containing up to 10 replacement stainless steel rods per assembly or unlimited number of lower enrichment UO_2 rods are acceptable for storage in 24PTH DSC as intact fuel assemblies. The stainless steel rods are assumed to have two-thirds the irradiation time as the remaining fuel rods of the assembly. The reconstituted UO_2 rods are assumed to have the same irradiation history as the entire fuel assembly. The reconstituted rods can be at any location in the fuel assemblies. The maximum number of reconstituted fuel assemblies per DSC is given in Table A.1.4.3-2.

The NUHOMS®-24PTH DSCs can also accommodate up to a maximum of 12 damaged fuel assemblies placed in cells located at the outer edge of the DSC as shown in Figure A.1.4.3-6. Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods, or fuel rods with known or suspected cladding defects greater hairline cracks, or pinhole leaks. The extent of damage in the fuel rods is to be limited such that a fuel assembly needs to be handled by normal means. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.

The NUHOMS®-24PTHF DSC, an alternative version of NUHOMS®-24PTH DSC, is designed to accommodate up to a maximum of 8 failed fuel assemblies encapsulated in individual failed fuel cans and placed in cells located at the outer edge of the DSC as shown in Figure A.1.4.3-6. Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly cannot be handled by normal means.

Fuel debris and damaged fuel rods that have been removed from a damaged fuel assembly and placed in a *r*od *s*torage *b*asket are also considered as failed fuel. Loose fuel debris, not contained in a *r*od *s*torage *b*asket may also be placed in a *f*ailed *f*uel *c*an for storage, provided the size of the debris is larger than the *f*ailed *f*uel *c*an screen mesh opening *and it is located at a position of at least 10" above the top of the bottom shield plug of the DSC.*

Fuel debris may be associated with any type of UO_2 fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its contents shall be less than 1682 lb.

A 24PTH DSC containing less than 24 fuel assemblies may contain either empty slots or dummy fuel assemblies in the empty slots. The dummy assemblies are unirradiated, stainless steel encased structures that approximate the weight and center of gravity of a fuel assembly.

A.1.4.3.4 References

1. American Society of Mechanical Engineers, ASME Boiler *a*nd Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG and NF, 1998 edition including 2000 Addenda.

Table A.1.4.3-1
Key Design Parameters of the NUHOMS®-24PTH System

Parameter	24PTH DSC Type		
	24PTH-S	**24PTH-L**	**24PTH-S-LC**
DSC Length (in)	186.55 (Maximum)	192.55 (Maximum)	186.*67* (Maximum)
DSC Outside Diameter (in)	*67.19*	*67.19*	*67.19*
DSC Cavity Length (in)	169.*60*	175.*10*	173.28
Basket Length (in)	168.*60*	174.10	172.28
Basket Diameter (in)	65.94	65.94	65.94

Note: Unless stated otherwise, nominal values are provided.

Table A.1.4.3-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-24PTH DSC
(Part 1 of 2)

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged or failed unconsolidated B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14 and WE 14x14 class PWR assemblies (with or without control components) that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.3-4. Equivalent reload fuel manufactured by same or other vendors but enveloped by the design characteristics listed in Table A.1.4.3-4 is also acceptable.
Damaged Fuel	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 assembly needs to be handled by normal means. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Failed Fuel	Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly can not be handled by normal means. Fuel debris and damaged fuel rods that have been removed from a damaged fuel assembly and placed in a *r*od *s*torage *b*asket are also considered as damaged fuel. Loose fuel debris, not contained in a *r*od *s*torage *b*asket may also be placed in a *f*ailed *f*uel *c*an for storage, provided the size of the debris is larger than the *f*ailed *f*uel *c*an screen mesh opening *and it is located at a position of at least 10" above the top of the bottom shield plug of the DSC.* Fuel debris may be associated with any type of UO_2 fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its contents shall be less than 1682 lb.
Partial Length Shield Assemblies (PLSAs)	WE 15x15 class PLSAs with following characteristics are authorized: • Maximum burnup, 40 GWd/MTU • Minimum cooling time, 10 years • Maximum *d*ecay *h*eat, 900 Watts
Reconstituted Fuel Assemblies: • Maximum No. of Reconstituted Assemblies per DSC with Irradiated Stainless Steel Rods • Maximum No. of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly • Maximum No. of Reconstituted Assemblies per DSC with Unlimited Number of Low Enriched UO_2 Rods and/or Unirradiated Stainless Steel Rods and/or Zr Rods or Zr Pellets	4 10 24

Table A.1.4.3-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-24PTH DSC
(Part 2 of 2)

Control Components (CCs)	• Up to 24 CCs are authorized for storage in 24PTH-S, 24PTH-L, and 24PTH-S-LC DSCs. • Authorized CCs include burnable poison rod assemblies (BPRAs), thimble plug assemblies (TPAs), control rod assemblies (CRAs), rod cluster control assemblies (RCCAs), axial power shaping rod assemblies (APSRAs), orifice rod assemblies (ORAs), vibration suppression inserts (VSIs), neutron source assemblies (NSAs), and neutron sources. • Design basis thermal and radiological characteristics for the CCs are listed in Table A.1.4.3-3.
Nominal Assembly Width for Intact and Damaged Fuel Assemblies Only	8.536 inches
No. of Intact Assemblies	≤24
No. and Location of Damaged Assemblies	Up to 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 Locations A and/or B as shown in Figure A.1.4.3-6. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.
No. and Location of Failed Assemblies	Up to 8 failed fuel assemblies. Balance may be intact and/or damaged fuel assemblies, empty slots, or dummy assemblies depending on the specific heat load zoning configuration. Failed fuel assemblies are to be placed in Location A as shown in Figure A.1.4.3-6. Failed fuel assembly/fuel debris is to be encapsulated in an individual failed fuel can (FFC) provided with a welded bottom closure and a removable top closure.
Maximum Assembly plus CC Weight	1682 lbs
THERMAL/RADIOLOGICAL PARAMETERS: Fuel Assembly Average Burnup and minimum Cooling Time(1) (2)	Per Table A.1.4.3-5, Table A.1.4.3-8, Table A.1.4.3-8A and decay heat and burnup credit restrictions below.
Maximum Decay Heat(1) Limits for Zones 1, 2, 3, and 4 Fuel	Per Figure A.1.4.3-1 or Figure A.1.4.3-2 or Figure A.1.4.3-3 or Figure A.1.4.3-4 or Figure A.1.4.3-5.
Decay Heat(1) per DSC	Type 1 Basket ≤ 26.0 kW for 24PTH-S and 24PTH-L DSCs with decay heat limit for Zones 1, 2, 3 and 4 as specified in Figure A.1.4.3-1, or Figure A.1.4.3-2, Figure A.1.4.3-3 or Figure A.1.4.3-4.
	Type 2 Basket Same as Type 1 Basket except ≤26.0 kW/DSC and ≤ 1.3 kW/fuel assembly for 24PTH-S and 24PTH-L DSCs. ≤ 24.0 kW for 24PTH-S-LC DSC with decay heat limits as≤ 24.0 kW for 24PTH-S-L DSC (Type 2 Basket) specified in Figure A.1.4.3-5.
Burnup Credit Restrictions(1)	Per Table A.1.4.3-8 for intact fuel assemblies and per Table A.1.4.3-8A for *all fuel assemblies when* damaged *and/*or failed fuel assemblies *are loaded.* *The maximum cooling time shall not exceed 160 years.*

Notes:

(1) Minimum cooling time is the longer of that given in Table A.1.4.3-5; that calculated via the decay heat equation given in Table A.1.4.3-9 based on the restrictions provided in Figures A.1.4.3-1, A.1.4.3-2, A.1.4.3-3 or A.1.4.3-4; and Table A.1.4.3-8 or Table A.1.4.3-8A.

(2) An additional cooling time of 8 years is required for damaged and/or failed fuel assemblies in addition to that obtained from Table A.1.4.3-5, when 5 or more damaged and/or failed fuel assemblies are loaded.

Table A.1.4.3-3
Thermal and Radiological Characteristics for Control Components Transported in the NUHOMS® -24PTH DSC

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

Table A.1.4.3-4
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**
Max 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	NA[3]	NA[3]	NA[3]	NA[3]	NA[3]
Fissile Material		UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Maximum MTU/Assembly[2]		0.49	0.482	0.482	0.482 [4]	0.482	0.482
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.
(4) The maximum MTU/assembly for WE 15x15 PLSA = 0.33.

Table A.1.4.3-5
PWR Fuel Qualification Table for NUHOMS®-24PTH DSC
(Minimum required years of cooling time after reactor core discharge)

BU GWD/ MTU	Assembly Average Initial U-235 Enrichment, wt. %																																										
	0.7	0.8	0.9	1.0	1.1	1.2	1.3	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	4.5	4.6	4.7	4.8	4.9	5.0
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
15	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
20	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
28									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
30									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
32									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
34									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
36									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
38									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
39									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
40									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
41									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
42																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
43																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
44																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
45																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
46																					10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
47																					11.5	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
48										Not Analyzed											12.5	12.0	11.0	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
49																								11.5	11.0	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50																								12.5	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
51																								13.5	13.0	12.0	11.5	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
52																									13.5	13.0	12.5	12.0	11.0	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
53																									14.5	14.0	13.5	13.0	12.5	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
54																										15.0	14.0	14.0	13.0	12.5	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
55																										16.0	15.0	15.0	14.0	13.5	12.5	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
56																										16.5	16.0	16.0	15.0	14.5	13.5	13.0	12.0	11.5	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
57																												17.0	16.5	15.5	14.5	14.0	13.0	12.5	11.5	11.0	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0
58																												18.5	17.5	16.5	15.5	15.0	14.5	13.5	12.5	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0
59																												19.5	18.5	17.5	17.0	16.0	15.0	14.5	14.0	13.0	12.5	11.5	11.0	10.0	10.0	10.0	10.0	10.0
60																												20.5	19.5	19.0	18.0	17.0	16.0	15.5	15.0	14.0	13.5	12.5	12.0	11.0	10.5	10.0	10.0	10.0
61																												21.5	20.5	20.0	19.0	18.0	17.5	16.5	16.0	15.0	14.5	13.5	13.0	12.5	11.5	10.5	10.0	10.0
62																												22.5	21.5	21.0	20.0	19.5	18.5	17.5	17.0	16.0	15.5	14.5	14.0	13.5	12.5	11.5	11.0	10.5

Note: Next page provides the explanatory notes and limitations regarding the use of this table.

Notes: Table A.1.4.3-5:

- BU = 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 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 assembly average enrichment either less than 0.7 or greater than 5.0 wt.% U-235 is unacceptable for *t*ransport.
- Fuel with a burnup greater than 62 GWd/MTU is unacceptable for transport.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transport after 10-years cooling.
- Example: An assembly with an initial enrichment of 4.85 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for transport after 10-year cooling time as defined by 4.8 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).
- Even though cooling times less than 15 years are shown in this table, the minimum cooling time requirement for criticality from Table A.1.4.3-8 and Table A.1.4.3-8A for transportation is 15 years.
- *The cooling times of failed, damaged, and intact assemblies are identical. However,* when loading five or more damaged *and/or failed* fuel assemblies per DSC, an additional cooling time of 8 years is required for only damaged *and/or failed* fuel assemblies.

Table A.1.4.3-6
B10 Specification for the NUHOMS®-24PTH Poison Plates

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

Notes:
(1) Basket Type 1 contains aluminum inserts in the R45 transition rails; Type 2 does not contain aluminum inserts.

Table A.1.4.3-7
Maximum Allowable Heat Load for the NUHOMS®-24PTH DSC

24PTH DSC Type	Basket Type(2)(3)	Max. Heat Load (kW) per DSC
24PTH-S or 24PTH-L(1)	1A, 1B, or 1C	26.0
24PTH-S or 24PTH-L(1)	2A, 2B, or 2C	26.0
24PTH-S-LC(1)	2A, 2B, or 2C	24.0

Notes:
(1) Allows storage of control components.
(2) Basket Type 1 (1A, 1B, 1C) has heat conductive aluminum inserts in the R45 basket transition rails.
(3) Basket Type 2 (2A, 2B, 2C) does not have heat conductive aluminum inserts in the R45 basket transition rails.

Table A.1.4.3-8
Acceptable Average Initial Enrichment / Minimum Burnup Combinations for NUHOMS®-24PTH – Intact Fuel Assemblies

(Part 1 of 2)

	WE 17x17, WE 15x15, BW 15x15, CE 14x14, *and* CE 15x15 assembly classes				
Enrichment (wt. % U-235)	Type A	Type B	Type C	Type A	Type B
1.55	fresh	-	-	fresh	-
1.65	-	fresh	-	-	fresh
1.80	-	-	fresh	-	-
	Burnup (GWd/MTU), 15 years decay			Burnup (GWd/MTU), 30 years decay	
2.00	18	14	8	17	12
2.25	19	19	15	19	18
2.50	24	21	19	21	19
2.75	28	24	20	25	21
3.00	32	28	23	30	26
3.25	35	31	28	31	30
3.50	39	34	31	35	32
3.75	41	38	33	38	35
4.00	44	39	36	40	37
4.20	47	43	38	42	39
4.40	50	45	41	45	41
4.60	-	48	43	48	43
4.80	-	50	45	50	45
5.00	-	-	47	-	47

Table A.1.4.3-8
Acceptable Average Initial Enrichment / Minimum Burnup Combinations for NUHOMS®-24PTH – Intact Fuel Assemblies

(Part 2 of 2)

	WE 14x14 assembly class	
Enrichment (wt. % U-235)	Type A	Type B
1.80	fresh	-
1.95	-	fresh
	Burnup (GWd/MTU), 30 Years decay	Burnup (GWd/MTU), 15 Years decay
2.00	6	5
2.25	11	9
2.50	17	14
2.75	19	18
3.00	20	19
3.25	24	21
3.50	28	25
3.75	31	29
4.00	32	31
4.20	34	33
4.40	37	35
4.60	39	37
4.80	41	39
5.00	42	41

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 conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted)
- Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt. % U-235 and 5.00 wt. % U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.
- Extrapolation shall not be performed to determine burnup requirements.
- The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.
- An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.
- *This table cannot be utilized to determine minimum burnup requirements when damaged and/or failed fuel assemblies are loaded. Table A.1.4.3-8A shall be utilized for this purpose.*

Table A.1.4.3-8A
Acceptable Average Initial Enrichment / Minimum Burnup Combinations for NUHOMS®-24PTH—
All Fuel Assemblies when Damaged Fuel Assemblies *are Loaded*

(Part 1 of 2)

	WE 17x17, WE 15x15, BW 15x15, CE 14x14, *and* CE 15x15 assembly classes				
Enrichment (wt. % U-235)	Type A	Type B	Type C	Type A	Type B
1.55	fresh	-	-	fresh	-
1.65	-	fresh	-	-	fresh
1.80	-	-	fresh	-	-
	Burnup (GWd/MTU), 15 Years decay			Burnup (GWd/MTU), 30 Years decay	
2.00	19	16	10	19	14
2.25	21	21	17	21	20
2.50	26	23	21	23	21
2.75	30	26	22	27	23
3.00	34	30	25	32	28
3.25	37	33	30	33	32
3.50	41	36	33	37	34
3.75	43	40	35	40	37
4.00	46	41	38	42	41
4.20	49	45	40	44	43
4.40	-	47	43	47	45
4.60	-	50	45	50	47
4.80	-	-	47	-	49
5.00	-	-	49	-	-

Table A.1.4.3-8A
Acceptable Average Initial Enrichment / Minimum Burnup Combinations for NUHOMS®-24PTH—
All Fuel Assemblies when Damaged Fuel Assemblies *are Loaded*

(Part 2 of 2)

	WE 14x14 assembly class	
Enrichment (wt. % U-235)	Type A	Type B
1.80	fresh	-
1.95	-	fresh
	Burnup (GWd/MTU), 30 Years decay	Burnup (GWd/MTU), 15 Years decay
2.00	10	8
2.25	15	13
2.50	20	18
2.75	24	20
3.00	28	23
3.25	30	27
3.50	32	31
3.75	34	32
4.00	36	34
4.20	38	37
4.40	41	39
4.60	42	41
4.80	45	44
5.00	46	46

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 conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted)
- Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt. % U-235 and 5.00 wt. % U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.
- Extrapolation shall not be performed to determine burnup requirements.
- The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.
- An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.
- *This table is utilized to determine the minimum burnup requirements for all fuel assemblies (intact, damaged, and/or failed) whenever damaged and/or failed fuel assemblies are loaded.*

Table A.1.4.3-9
PWR Assembly Decay Heat for Heat Load Configurations

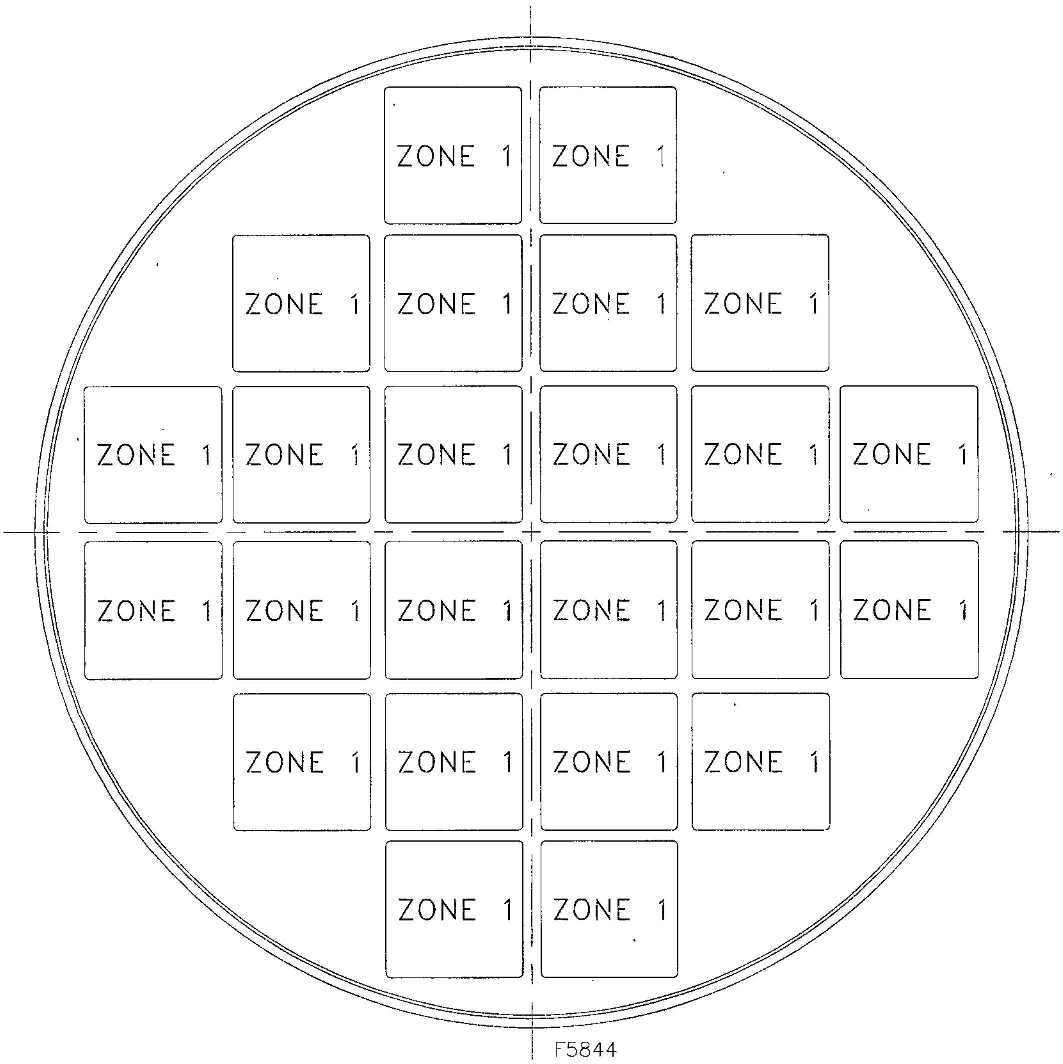
The Decay Heat (DH) in watts is expressed as:

$$F1 = -44.8 + 41.6*X1 - 37.1*X2 + 0.611*X1^2 - 6.80*X1*X2 + 24.0*X2^2$$
$$DH = F1*Exp(\{[1-(1.8/X3)]* -0.575\}*[(X3-4.5)^{0.169}]*[(X2/X1)^{-0.147}]) + 20$$

where,

F1 Intermediate Function
X1 Assembly Burnup in GWD/MTU
X2 Initial Enrichment in wt. % U-235
X3 Cooling Time in Years (minimum 10 years)

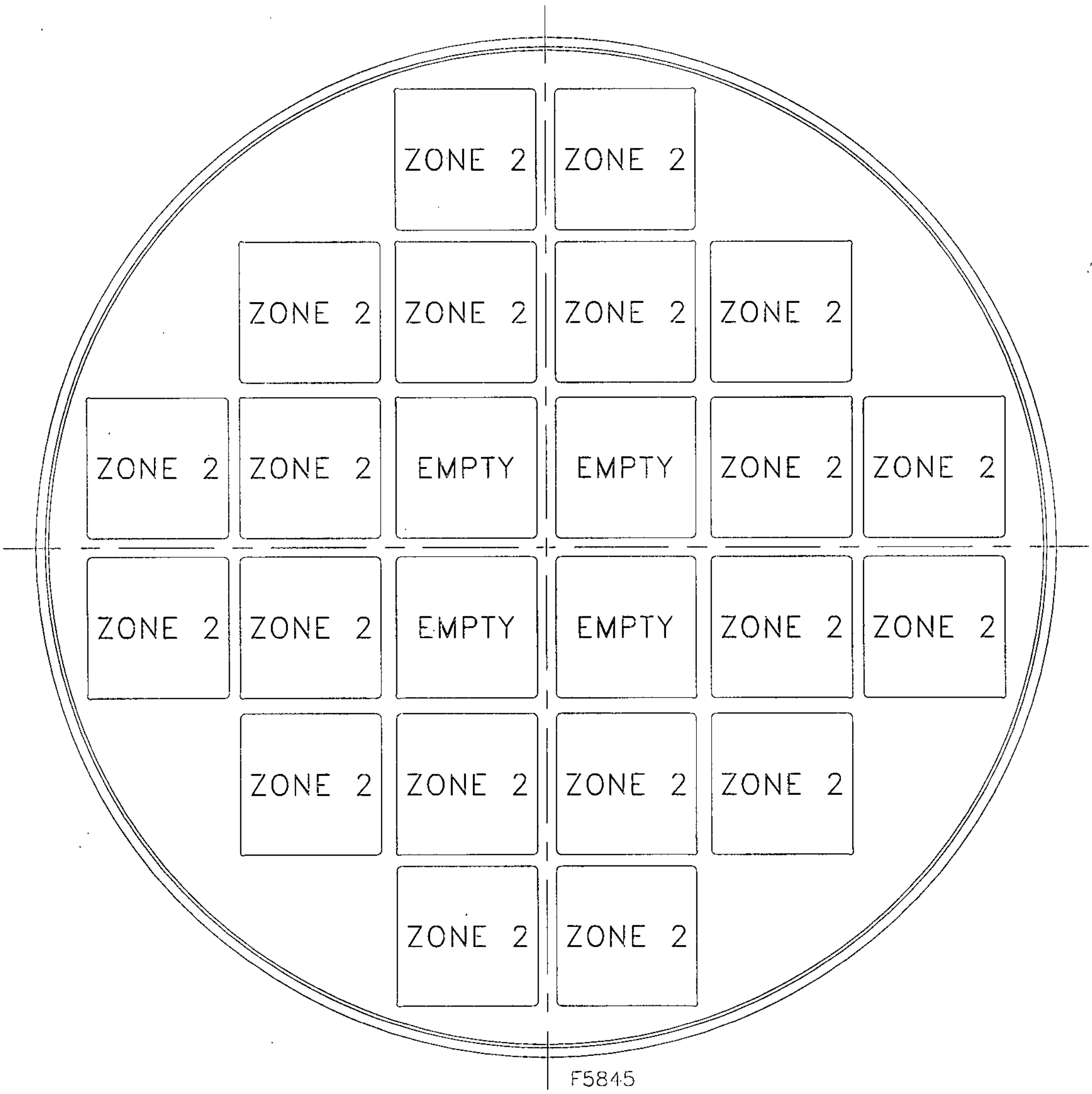
Note: Even though a minimum cooling time of 10 years is used, the minimum cooling time requirement for criticality from Table A.1.4.3-8 *and Table A.1.4.3-8A* is 15 years.



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)(1)(2)	1.7	NA	NA	NA
Maximum Decay Heat per Zone (kW)	26.0	NA	NA	NA
Maximum Decay Heat per DSC (kW)	26.0			

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.3-9.
(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.

Figure A.1.4.3-1
Heat Load Zoning Configuration No. 1 for 24PTH-S and 24PTH-L DSCs
(with or without Control Components)

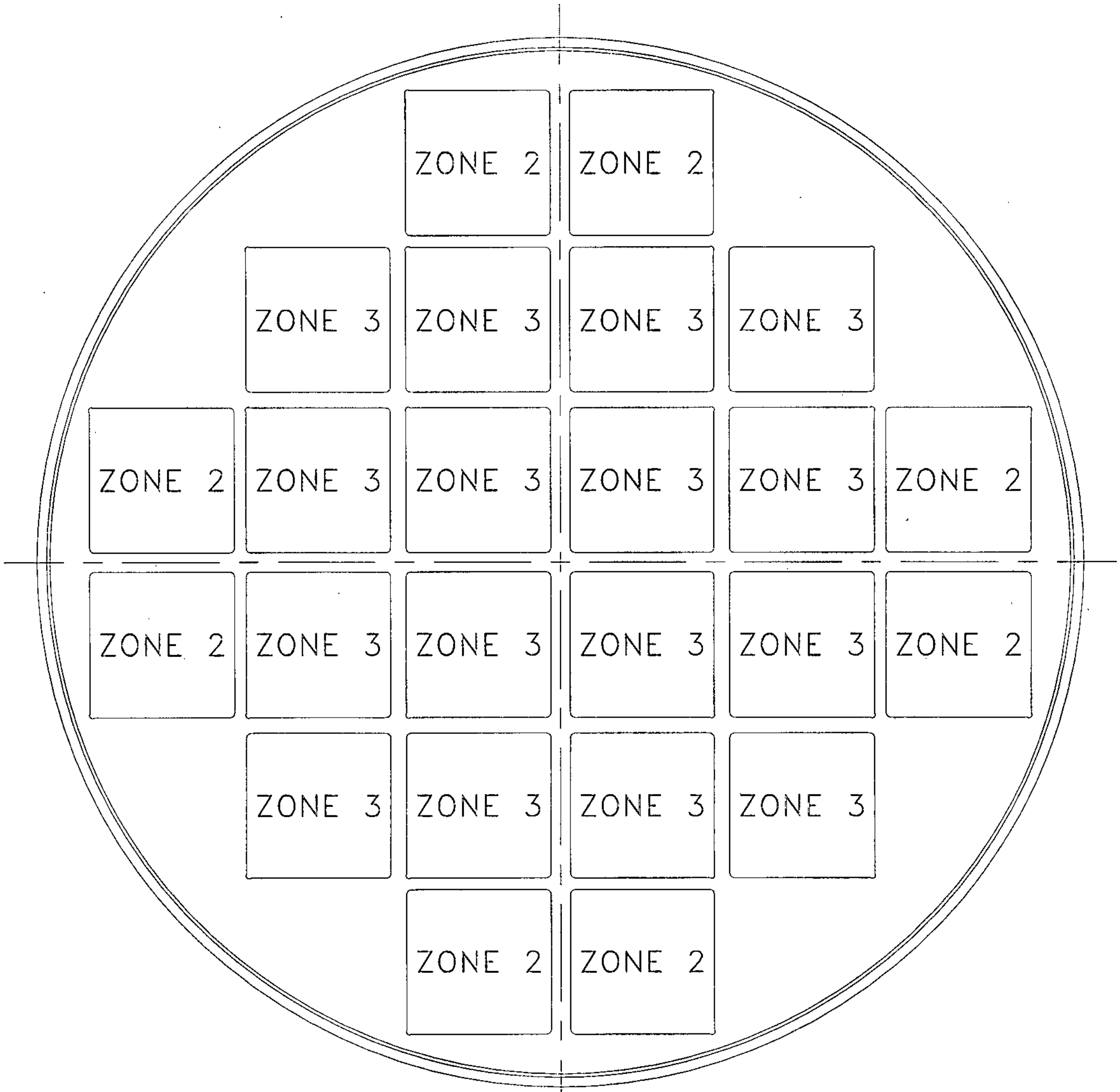


	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)[(1)(2)]	NA	2.0	NA	NA
Maximum Decay Heat per Zone (kW)	NA	26.0	NA	NA
Maximum Decay Heat per DSC (kW)	26.0			

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.3-9.

(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.

Figure A.1.4.3-2
Heat Load Zoning Configuration No. 2 for 24PTH-S and 24PTH-L DSCs
(with or without Control Components)

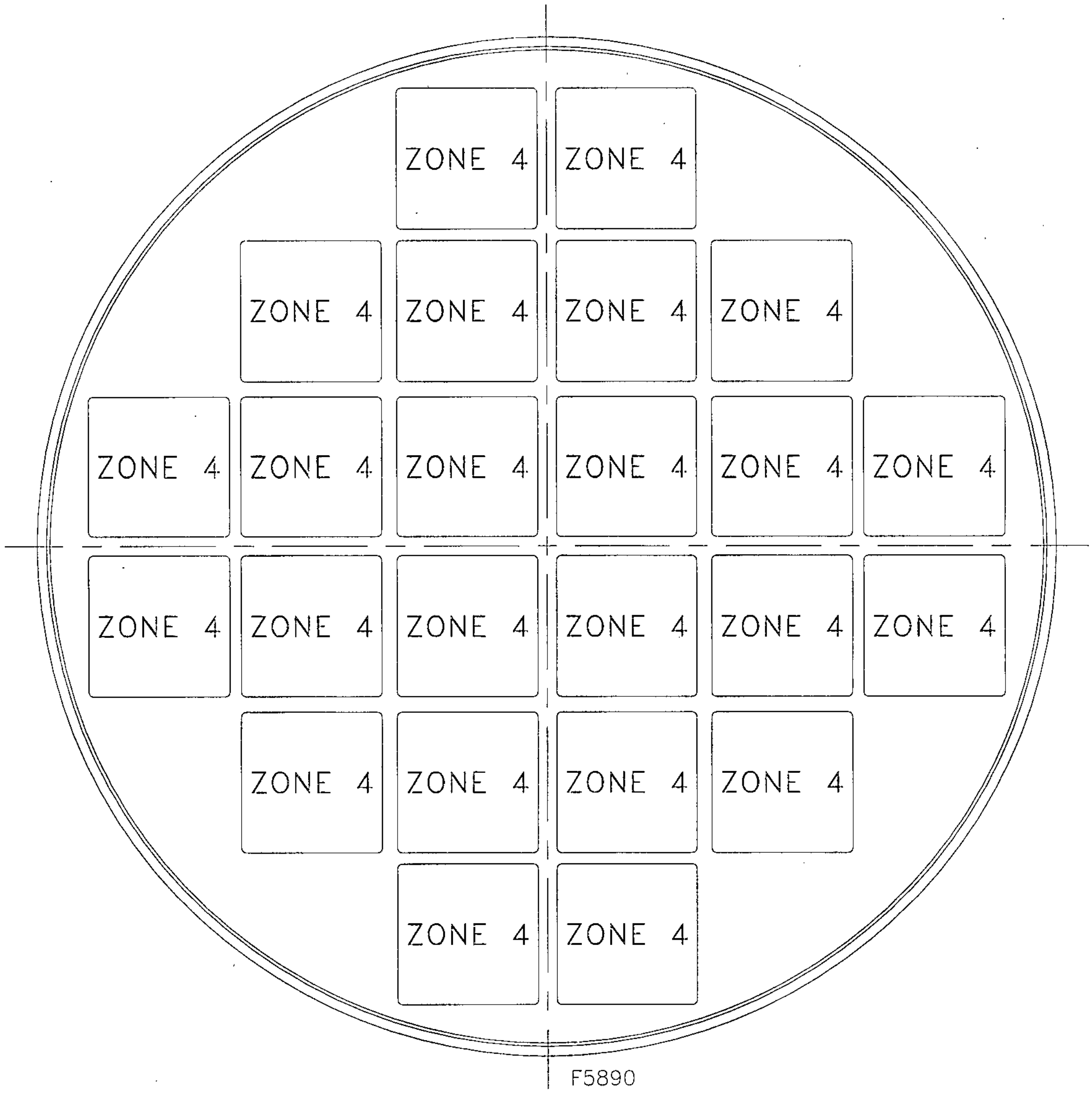


	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)[(1)(2)]	NA	2.0	1.5	NA
Maximum Decay Heat per Zone (kW)	NA	16	24	NA
Maximum Decay Heat per DSC (kW)	26.0			

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.3-9.

(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.

Figure A.1.4.3-3
Heat Load Zoning Configuration No. 3 for 24PTH-S and 24PTH-L DSCs
(with or without Control Components)

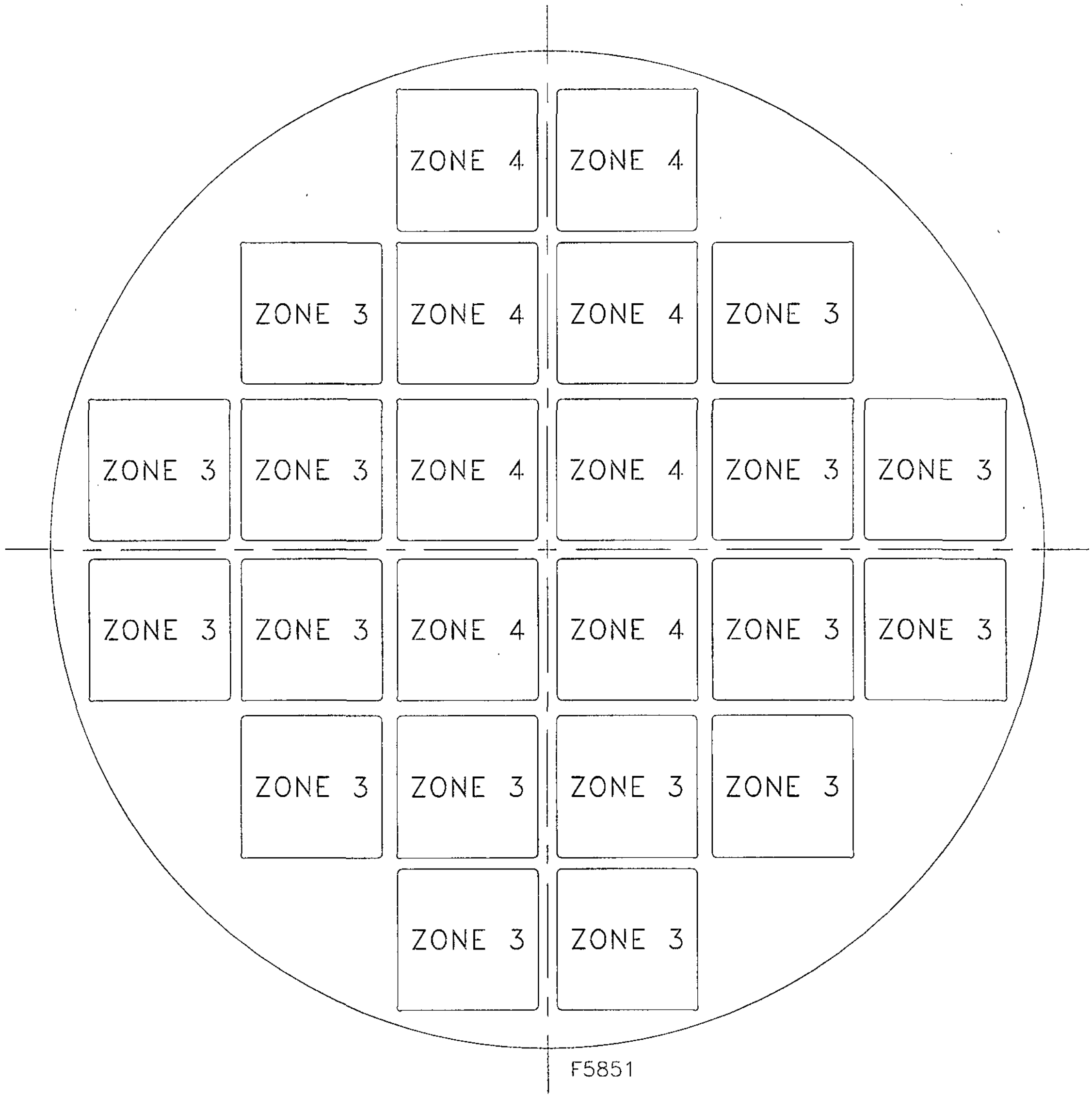


	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)(1)(2)	NA	NA	NA	1.3
Maximum Decay Heat per Zone (kW)	NA	NA	NA	26.0
Maximum Decay Heat per DSC (kW)	26.0			

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.3-9.

(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.

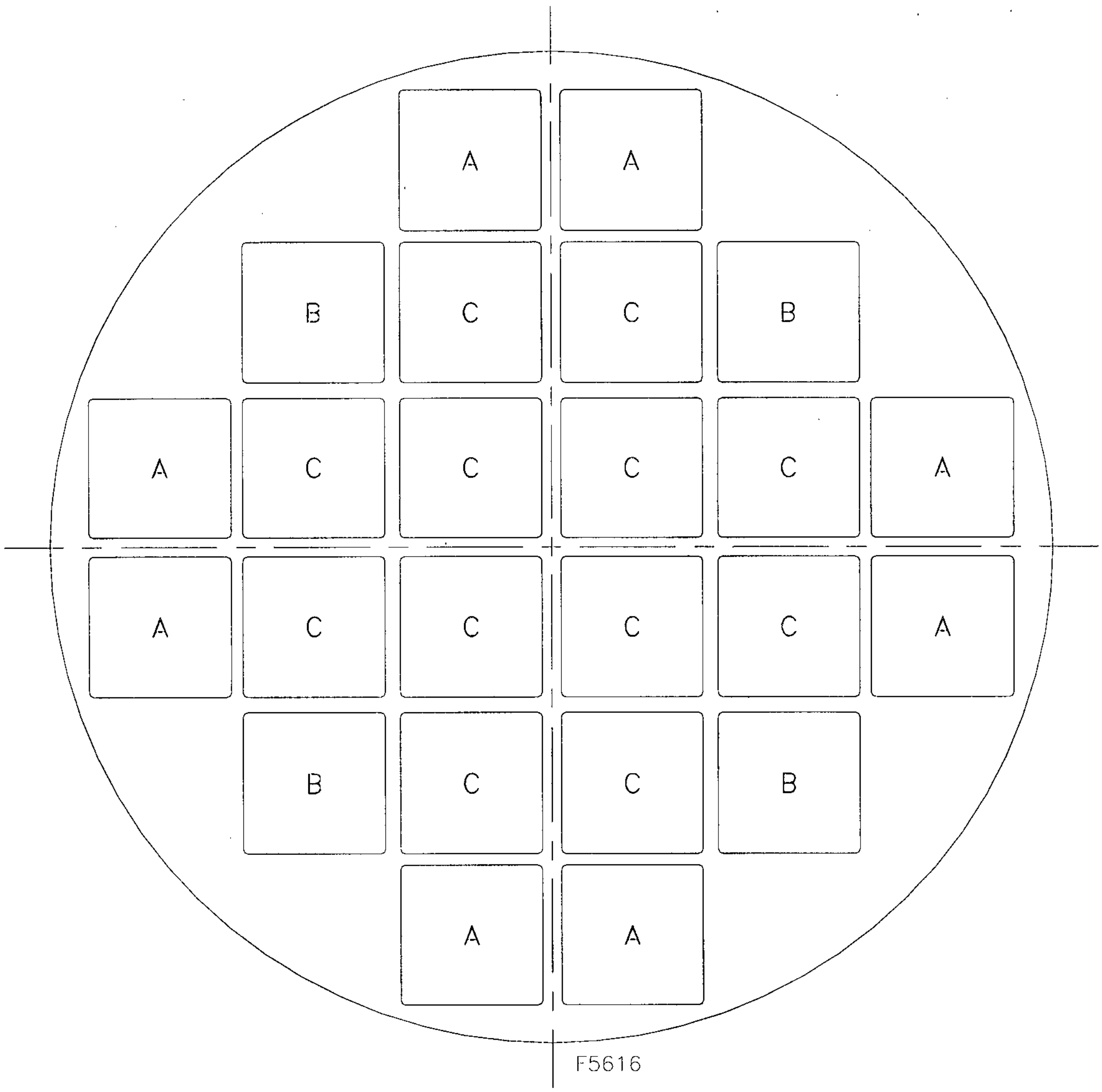
Figure A.1.4.3-4
Heat Load Zoning Configuration No. 4 for 24PTH-S and 24PTH-L DSCs
(with or without Control Components)



	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat kW/FA)(1)(2)	NA	NA	1.5	1.3
Maximum Decay Heat per Zone (kW)	NA	NA	Note 3	10.4
Maximum Decay Heat per DSC (kW)	24.0			

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.3-9.
(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.
(3) Fuel assemblies with a maximum heat load of 1.5 kW are permitted in Zone 3 provided a 24 kW/canister maximum heat load is maintained.
(4) This configuration is applicable to Basket Types 2A, 2B, or 2C only (without aluminum inserts).

Figure A.1.4.3-5
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 failed fuel assemblies (balance intact).
2. Locations identified as "B" are for placement of up to 4 additional damaged fuel assemblies (Maximum of 12 damaged fuel assemblies allowed, Locations "A" and "B" combined) (balance intact).
3. Locations identified as "C" are for placement of up to 12 intact fuel assemblies, including 4 empty slots in the center as shown in Figure A.1.4.3-2.

Figure A.1.4.3-6
Location of Damaged and Failed Fuel inside 24PTH DSC

Appendix A.1.4.4
NUHOMS®-32PTH DSC

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LIST OF FIGURES

Appendix A.1.4.4
NUHOMS®-32PTH DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.4.4.

A.1.4.4.1 NUHOMS®-32PTH DSC Description

Each NUHOMS®-32PTH DSC consists of a DSC shell assembly and a basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* As shown in Table A.1.4.4-1, the 32PTH DSC consists of two design configurations as follows:

- 32PTH
- 32PTH Type 1

Table A.1.4.4-1 provides the overall lengths and outer diameters for each 32PTH DSC configuration. The shell assemblies are high integrity stainless steel welded pressure vessels that provide confinement of radioactive materials, encapsulate the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed), and provide biological shielding (in axial direction). The 32PTH DSCs have double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 32PTH DSCs. The top end closure welds are made after fuel loading. Both top plug penetrations (siphon and vent ports) are redundantly sealed after the 32PTH DSC drying operations are complete.

The canister is designed to contain its fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails attached to the inside of the transport cask.

A.1.4.4.2 NUHOMS®-32PTH DSC Fuel Basket

The basket structures are designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall lengths and diameters of the baskets for each canister configuration are provided in Table A.1.4.4-1. The details of the 32PTH fuel baskets are shown in the drawings in Section A.1.4.10.5 of Appendix A.1.4.10. The 32PTH baskets are designed to accommodate 32 intact or up to 16 damaged with the remainder intact PWR fuel assemblies with or without Control Components (CCs). The basket structure consists of a welded assembly of stainless steel tubes with the space between adjacent tubes filled with aluminum and neutron poison plates and surrounded by support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel tube assembly. The basket is laterally supported by the basket rails and the canister shell. The stainless steel and aluminum basket rails are oriented

parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

Blocks (32PTH DSC) and shear keys *(32PTH Type 1 DSC) are used* to prevent the basket from rotating during normal operations.

Aluminum and/or neutron absorbing poison plates are sandwiched between the fuel compartments. The poison plates are constructed of either borated aluminum or Metal Matrix Composites (MMCs) or Boral® that provide criticality control and together with the aluminum plates provide a heat conduction path from the fuel assemblies to the canister wall. Table A.1.4.4-6 provides the minimum B10 content as a function of basket type and poison plate material.

A.1.4.4.3 NUHOMS®-32PTH DSC Contents

The NUHOMS® 32PTH DSC and the NUHOMS® 32PTH Type 1 DSC are designed for the transport of 32 intact and/or up to 16 damaged with remaining intact PWR fuel assemblies as specified in Table A.1.4.4-2 and Table A.1.4.4-3. The fuel to be transported is limited to a maximum assembly average initial enrichment of 5.0 wt. % ^{235}U. The maximum allowable assembly average burnup is limited to 60 GWd/MTU and the minimum cooling time *requirements are given in Table A.1.4.4-2.* The fuel assemblies may be transported with or without Control Components (CCs). The CC thermal and radiological characteristics are listed in Table A.1.4.4-4.

The 32PTH DSC may transport up to 32 PWR fuel assemblies arranged in accordance with a heat load zoning configuration as shown in Figure A.1.4.4-1, with a maximum decay heat of 1.5 kW per assembly and a maximum heat load of 26 kW per DSC.

The 32PTH DSC can accommodate up to 16 damaged fuel assemblies which include assemblies with missing or partial fuel rods, or fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of the damage is to be limited such that a fuel assembly can be handled by normal means. Damaged fuel assemblies shall be placed into the sixteen inner most basket fuel compartments, as shown in Figure A.1.4.4-2, which contain top and bottom end caps that confine any loose material and gross fuel particles to a known, sub-critical volume during normal and accident conditions.

A.1.4.4.4 References

1. American Society of Mechanical Engineers, ASME Boiler And Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG and NF, 1998 edition including 2000 Addenda.

Table A.1.4.4-1
Key Design Parameters of the NUHOMS®-32PTH System

Parameter	32PTH	32PTH Type 1
DSC Length (in)	185.75 (Maximum)	193.00 (Maximum)
DSC Outside Diameter (in)	69.75	69.75
DSC Cavity Length (in)	164.5	171.63
DSC Shell Thickness (in)	0.5	0.5
Basket Length (in)	162.00	169.00
Basket Diameter (in)	68.50	68.50

Note: Unless stated otherwise, nominal values are provided.

Table A.1.4.4-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-32PTH DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged Westinghouse 17x17 (WE 17x17), Westinghouse 15x15 (WE 15x15), Combustion Engineering 16x16 (CE 16x16), and/or Combustion Engineering 14x14 (CE 14x14) class PWR fuel assemblies (with or without control components) that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.4-3. Reload fuel manufactured by the same or other vendors but bounded by the design characteristics listed in Table A.1.4.4-3 is also acceptable.
Damaged Fuel	Damaged PWR fuel assemblies are assemblies with missing or partial fuel rods, or fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of the damage is to be limited such that a fuel assembly needs to be handled by normal means. *Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.*
Reconstituted Fuel Assemblies: • Maximum No. of Reconstituted Assemblies per DSC with Irradiated Stainless Steel Rods • Maximum No. of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly • Maximum No. of Reconstituted Assemblies per DSC with Unlimited Number of Low Enriched UO2 Rods and/or Unirradiated Stainless Steel Rods and/or Zr Rods or Zr Pellets	 4 10 32
Control Components (CCs)	• Up to 32 CCs are authorized for storage in 32PTH DSC. • Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Control Element Assemblies (CEAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs), and Neutron Sources. • Design basis thermal and radiological characteristics for the CCs are listed in Table A.1.4.4-4.
No. of Intact Assemblies	≤32

Table A.1.4.4-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-32PTH DSC
(concluded)

No. and Location of Damaged Assemblies	Up to 16 damaged fuel assemblies with the balance intact fuel assemblies, or dummy assemblies. Damaged fuel assemblies are to be placed in the center 16 locations as shown in Figure A.1.4.4-2. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.
Maximum Assembly plus CC Weight	1585 lbs
THERMAL/RADIOLOGICAL PARAMETERS: Fuel Assembly Average Burnup and minimum Cooling Time(1)	Per Table A.1.4.4-5; Table A.1.4.4-8, Table A.1.4.4-8A and decay heat and burnup credit restrictions below.
Decay Heat(1)	Per Figure A.1.4.4-1
Burnup Credit Restrictions(1)	Per Table A.1.4.4-8 for Intact Fuel Assemblies and per Table A.1.4.4-8A for Damaged Fuel Assemblies. *The maximum cooling time shall not exceed 160 years.*

Notes:
(1) Minimum cooling time is the longer of that given in Table A.1.4.4-5; that calculated via the decay heat equation given in Table A.1.4.4-7; based on the restrictions provided in Figures A.1.4.4-1; and Table A.1.4.4-8 or Table A.1.4.4-8A.

Table A.1.4.4-3
Spent Fuel Assembly Physical Characteristics

Assembly Class		WE 17x17	WE 15x15	CE 14x14	CE 16x16
Max Unirradiated Length (in)(1)	32PTH	162.6	162.6	162.6	162.6
	32PTH Type 1	170.0	170.0	170.0	170.0
Fissile Material		UO_2	UO_2	UO_2	UO_2
Cladding Material		Zircalloy /Zirlo/ M5	Zircalloy /Zirlo/ M5	Zircalloy /Zirlo/ M5	Zircalloy /Zirlo/ M5
Maximum MTU/Assembly (2)		0.476	0.476	0.476	0.476
Maximum Number of Fuel Rods		264	204	176	236
Maximum Number of Guide/ Instrument Tubes		25	21	5	5

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

Table A.1.4.4-4
Control Component Thermal and Radiological Characteristics

Parameter	**Control Component Source Term**
Gamma Source (γ/sec/DSC)	7.36E+15
Decay heat (Watts/assy)	9

Table A.1.4.4-5
PWR Fuel Qualification Table for NUHOMS®-32PTH DSC
(Minimum required years of cooling time after reactor core discharge)

BU GWD/MTU	Assembly Average Initial U-235 Enrichment, wt. %																																											
	0.3	0.6	0.9	1.0	1.1	1.2	1.3	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	4.5	4.6	4.7	4.8	4.9	5.0
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
15	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
20	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
28									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
30									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
32									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
34									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
36									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
38									12.5	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
39									14.0	13.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
40									15.0	14.0	13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
41									16.5	15.5	14.5	13.5	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
42																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
43																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
44																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
45																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
46																					10.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
47																					11.5	11.5	11.0	11.0	11.0	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
48																					12.5	12.0	12.0	12.0	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
49																								12.5	12.5	12.5	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50																								13.5	13.5	13.5	13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
51																								14.5	14.5	14.0	14.0	13.0	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
52																									15.5	15.0	15.0	14.0	13.5	12.5	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
53																									16.5	16.5	16.0	15.5	14.5	13.5	12.5	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
54																										17.5	17.0	16.5	15.5	14.5	14.0	13.0	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
55																										18.5	18.0	17.5	16.5	16.0	15.0	14.0	13.0	12.5	11.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0
56																										19.5	19.0	19.0	18.0	17.0	16.0	15.5	14.5	13.5	12.5	12.0	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.5
57																												20.0	19.0	18.0	17.5	16.5	15.5	14.5	14.0	13.0	12.0	11.5	11.5	11.0	11.0	11.0	11.0	11.0
58																												21.0	20.5	19.5	18.5	17.5	16.5	16.0	15.0	14.0	13.5	12.5	12.0	12.0	12.0	11.5	11.5	11.5
59																												22.0	21.5	20.5	19.5	19.0	18.0	17.0	16.0	15.5	14.5	13.5	13.0	13.0	12.5	12.5	12.5	12.0
60																												23.5	22.5	22.0	21.0	20.0	19.0	18.0	17.5	16.5	15.5	15.0	14.0	13.5	13.0	13.0	13.0	13.0

Not Analyzed

Note: Next page provides the explanatory notes and limitations regarding the use of this table.

Notes: Table A.1.4.4-5:

- BU = Assembly average burnup.
- Use burnup and enrichment to look-up minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup 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 either less than 0.3 or greater than 5.0 wt.% U-235 is unacceptable for Transport.
- Fuel with a burnup greater than 60 GWd/MTU is unacceptable for transport.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transport after 10-years cooling.
- Example: An assembly with an initial enrichment of 4.85 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for transport after 10-year cooling time as defined by 4.8 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).
- Even though cooling times less than 15 years are shown in this table, the minimum cooling time requirement for criticality from Table A.1.4.4-8 *and Table 1.4.4-8A* for transportation is 15 years.

Table A.1.4.4-6
B10 Specification for the NUHOMS®-32PTH Poison Plates

NUHOMS®-32PTH DSC Basket Type	**Minimum B10 Areal Density, gm/cm²**	
	Natural or Enriched Boron Aluminum Alloy / Metal Matrix Composite (MMC)	Boral®
IA or IIA	0.007	0.009
IB or IIB	0.015	0.019
IC or IIC	0.020	0.025
ID	0.032	N/A
IE	0.050	N/A

Table A.1.4.4-7
PWR Assembly Decay Heat for Heat Load Configurations

The Decay Heat (DH) in watts is expressed as:

$$F1 = -44.8 + 41.6*X1 - 37.1*X2 + 0.611*X1^2 - 6.80*X1*X2 + 24.0*X2^2$$
$$DH = F1*Exp(\{[1-(1.8/X3)]* -0.575\}*[(X3-4.5)^{0.169}]*[(X2/X1)^{-0.147}]) + 20$$

where,

F1 Intermediate Function
X1 Assembly Burnup in GWD/MTU
X2 Initial Enrichment in wt. % U-235
X3 Cooling Time in Years (minimum 10 years)

Note: Even though a minimum cooling time of 10 years is used, the minimum cooling time requirement for criticality from Table A.1.4.4-8 *and Table 1.4.4-8A* is 15 years.

Table A.1.4.4-8
Acceptable Average Initial Enrichment/Minimum Burnup Combinations - NUHOMS®-32PTH –*Intact Fuel Assemblies*

Enrichment (wt. % U-235)	*WE 17x17, WE 15x15, CE 14x14 and CE 16x16 fuel assembly classes*									
	Type A	*Type B*	*Type C*	*Type D*	*Type E*	*Type A*	*Type B*	*Type C*	*Type D*	*Type E*
1.45	*fresh*	-	-	-	-	*fresh*	-	-	-	-
1.55	-	*fresh*	-	-	-	-	*fresh*	-	-	-
1.60	-	-	*fresh*	-	-	-	-	*fresh*	-	-
1.70	-	-	-	*fresh*	-	-	-	-	*fresh*	-
1.80	-	-	-	-	*fresh*	-	-	-	-	*fresh*
	Burnup (GWD/MTU), 15 years decay					***Burnup (GWD/MTU), 30 years decay***				
2.00	20	16	14	11	7	19	15	13	9	6
2.25	23	19	19	17	14	20	19	18	15	12
2.50	29	22	20	19	19	24	20	19	19	18
2.75	31	27	25	22	20	29	24	23	20	19
3.00	36	31	30	26	23	32	28	27	24	20
3.25	39	33	32	30	27	35	31	30	28	24
3.50	41	38	36	32	30	39	34	33	31	28
3.75	45	40	39	36	32	41	37	35	33	31
4.00	50	43	42	39	35	44	39	39	36	33
4.20	-	46	44	41	38	46	41	40	38	35
4.40	-	-	46	43	39	49	44	42	39	37
4.60	-	-	49	45	41	-	46	44	40	39
4.80	-	-	-	47	43	-	49	47	43	40
5.00	-	-	-	50	45	-	-	50	45	42

Notes:

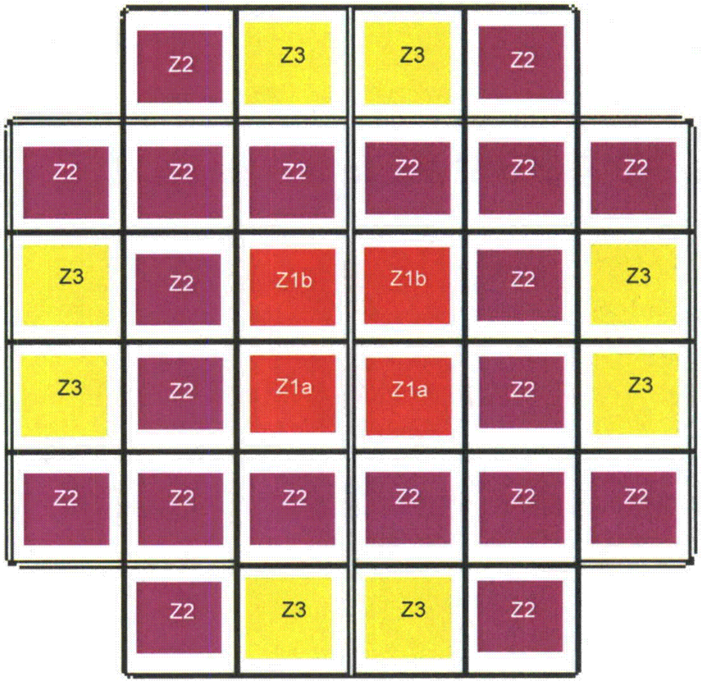
- *Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted)*
- *Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt. % U-235 and 5.00 wt. % U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.*
- *Extrapolation shall not be performed to determine burnup requirements.*
- *The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.*
- *An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.*

Table A.1.4.4-8*A*
Acceptable Average Initial Enrichment/Minimum Burnup Combinations - NUHOMS®-32PTH – *Damaged Fuel Assemblies*

Enrichment (wt. % U-235)	***WE 17x17, WE 15x15, CE 14x14 and CE 16x16 fuel assembly classes***									
	Type A	***Type B***	***Type C***	***Type D***	***Type E***	***Type A***	***Type B***	***Type C***	***Type D***	***Type E***
1.50	*fresh*	-	-	-	-	*fresh*	-	-	-	-
1.60	-	*fresh*	-	-	-	-	*fresh*	-	-	-
1.65	-	-	*fresh*	-	-	-	-	*fresh*	-	-
1.75	-	-	-	*fresh*	-	-	-	-	*fresh*	-
1.80	-	-	-	-	*fresh*	-	-	-	-	*fresh*
	Burnup (GWD/MTU), 15 years decay					***Burnup (GWD/MTU), 30 years decay***				
2.00	*23*	*19*	*19*	*15*	*12*	*19*	*18*	*16*	*13*	*10*
2.25	*28*	*23*	*20*	*19*	*18*	*23*	*19*	*19*	*19*	*17*
2.50	*31*	*28*	*26*	*23*	*21*	*29*	*25*	*22*	*20*	*19*
2.75	*37*	*32*	*31*	*28*	*25*	*33*	*30*	*28*	*25*	*22*
3.00	*41*	*37*	*35*	*33*	*30*	*37*	*33*	*31*	*29*	*26*
3.25	*44*	*41*	*39*	*36*	*33*	*40*	*37*	*35*	*32*	*31*
3.50	*49*	*45*	*43*	*39*	*37*	*44*	*39*	*39*	*35*	*33*
3.75	-	*49*	*47*	*43*	*40*	*48*	*42*	*41*	*39*	*37*
4.00	-	-	-	*46*	*43*	-	*46*	*44*	*41*	*39*
4.20	-	-	-	*49*	*46*	-	*49*	*47*	*44*	*41*
4.40	-	-	-	-	*50*	-	-	*50*	*47*	*44*
4.60	-	-	-	-	-	-	-	-	*50*	*47*
4.80	-	-	-	-	-	-	-	-	-	*50*
5.00	-	-	-	-	-	-	-	-	-	-

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 conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted)
- Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt. % U-235 and 5.00 wt. % U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.
- Extrapolation shall not be performed to determine burnup requirements.
- The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.
- *An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.*

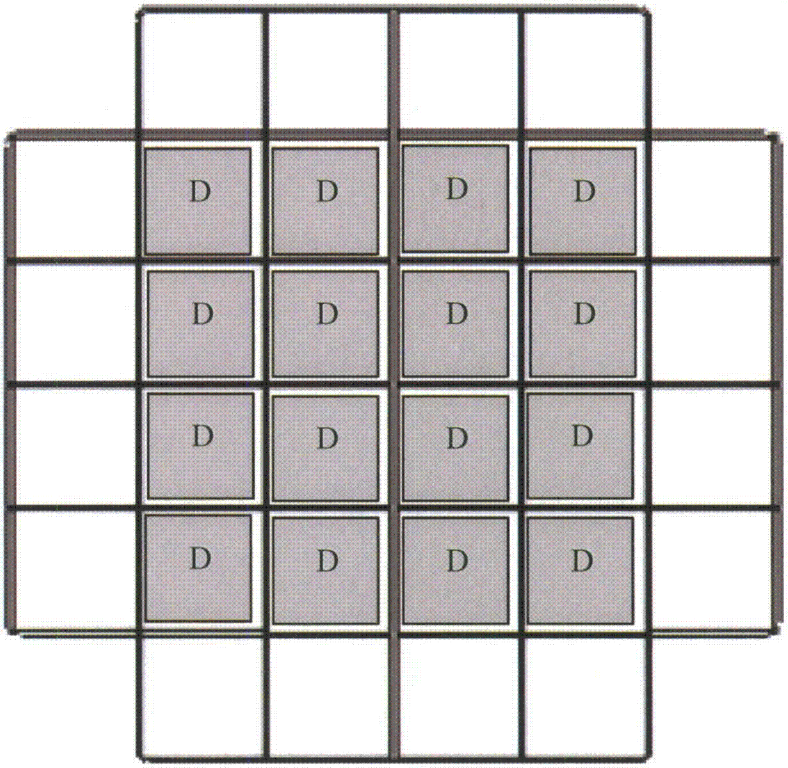


For WE 17x17, WE 15x15 and CE 16x16 Assembly Classes				
	Zone 1a	**Zone 1b**	**Zone 2**	**Zone 3**
Maximum Decay Heat (kW/FA)(1)(2)	1.05	0.8	1.1	1.5
Maximum Decay Heat per Zone (kW)	3.2		22	12
Maximum Decay Heat per DSC (kW)	26.0			
For CE 14x14 Assembly Class				
Maximum Decay Heat (kW/FA)(1)(2)	0.775	0.775	1.068	1.5
Maximum Decay Heat per Zone (kW)	3.1		21.3	12.0
Maximum Decay Heat per DSC (kW)	26.0			

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.4-7.

(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by 9 watts.

Figure A.1.4.4-1
Heat Load Zoning Configurations for 32PTH DSC



Up to 16 damaged assemblies with the remaining intact assemblies.

Figure A.1.4.4-2
Location of Damaged Assemblies

Appendix A.1.4.5
NUHOMS®-32PTH1 DSC

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Appendix A.1.4.5
NUHOMS®-32PTH1 DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.5.4.

A.1.4.5.1 NUHOMS®-32PTH1 DSC Description

Each NUHOMS®-32PTH1 DSC consists of a DSC shell assembly and a basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* As shown in Table A.1.4.5-1, the 32PTH1 DSC system consists of three design configurations as follows:

- 32PTH1-S, Short DSC
- 32PTH1-M, Medium DSC
- 32PTH1-L, Long DSC

Table A.1.4.5-1 provides the overall lengths and outer diameters for each 32PTH1 DSC configuration. The shell assemblies are high integrity stainless steel welded pressure vessels that provide confinement of radioactive materials, encapsulate the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed), and provide biological shielding (in axial direction). The 32PTH1 DSCs have double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 32PTH1 DSCs. The top end closure welds are made after fuel loading. Both top plug penetrations (siphon and vent ports) are redundantly sealed after the 32PTH1 DSC drying operations are complete.
The canister is designed to contain its fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails attached to the inside of the MP197HB transport cask.

A.1.4.5.2 NUHOMS®-32PTH1 DSC Fuel Basket

The basket structures are designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall lengths and diameters of the baskets for each canister configuration are provided in Table A.1.4.5-1. The details of the 32PTH1 fuel baskets are shown in the drawings in Section A.1.4.10.6 of Appendix A.1.4.10. The 32PTH1 baskets are designed to accommodate 32 intact, or up to 16 damaged with the remainder intact, PWR fuel assemblies with or without Control Components. The basket structure consists of a welded assembly of stainless steel tubes with the space between adjacent tubes filled with aluminum and neutron poison plates and surrounded by support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel tube assembly. The basket is laterally supported by the basket rails and the canister shell. The stainless steel and aluminum basket rails are oriented

parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

*S*hear key*s*, welded to the inner wall of the DSC, mate with notch*es* in the basket support rails to prevent the basket from rotating during normal operations.

Aluminum and/or neutron absorbing poison plates are sandwiched between the fuel compartments. Table A.1.4.5-6 provides the minimum B10 content as a function of basket type and poison plate material. Table A.1.4.5-7 provides the maximum allowable heat load for the various 32PTH1 DSC configurations for transport.

A.1.4.5.3 NUHOMS®-32PTH1 DSC Contents

Each of the three alternate DSC configurations is designed to transport intact (including reconstituted) and/or damaged PWR fuel assemblies as specified in Table A.1.4.5-2 and Table A.1.4.5-4. The fuel to be transported is limited to a maximum assembly average initial enrichment of 5.0 wt.% U-235. The maximum allowable assembly average burnup is limited to 62 GWd/MTU and the minimum cooling time *requirements are given in Table A.1.4.5-2*. Each of the DSC types is designed to transport Control Components (CCs) with thermal and radiological characteristics as listed in Table A.1.4.5-3. The CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs) and Neutron Sources.

Reconstituted assemblies containing up to 10 replacement irradiated stainless steel rods per assembly, or unlimited number of lower enrichment UO_2 rods instead of Zircaloy clad enriched UO_2 rods, or Zr rods or Zr pellets, or unirradiated stainless steel rods are acceptable for storage in the 32PTH1 DSC as intact fuel assemblies. The stainless steel rods are assumed to have two-thirds the irradiation time as the remaining fuel rods of the assembly. The reconstituted UO_2 rods are assumed to have the same irradiation history as the entire fuel assembly. The reconstituted rods can be at any location in the fuel assemblies. The maximum number of reconstituted fuel assemblies per DSC is four with irradiated stainless steel replacement rods or 32 with lower enrichment UO_2 replacement rods.

The NUHOMS®-32PTH1 DSCs can also accommodate up to a maximum of 16 damaged fuel assemblies placed in the center cells of the DSC as shown in Figure A.1.4.5-1 through Figure A.1.4.5-3. 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 damage in the fuel assembly is to be limited such that a fuel assembly is able to be handled by normal means. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.

A 32PTH1 DSC containing less than 32 fuel assemblies may contain dummy fuel assemblies in the empty slots. The dummy assemblies are unirradiated, stainless steel encased structures that approximate the weight and center of gravity of a fuel assembly.

The 32PTH1 DSC basket is designed with two options: Type 1 basket with solid aluminum transition rails and Type 2 basket with steel transition rails including aluminum inserts. Type 1 basket is the preferred option for canisters with high decay heat loads, since the solid aluminum rails allow a more direct heat conduction path from the basket edge to the DSC shell.

The NUHOMS®-32PTH1 DSCs may transport up to 32 PWR fuel assemblies arranged in any of the three alternate heat load zoning configurations (HLZC) as shown in Figure A.1.4.5-1 through Figure A.1.4.5-3. The maximum decay heat per fuel assembly and the maximum canister heat load allowed is also specified in Figure A.1.4.5-1 through Figure A.1.4.5-3. The maximum allowed heat load for the various 32PTH1 system configurations are presented in Table A.1.4.5-7.

A.1.4.5.4 References

1. American Society of Mechanical Engineers, ASME Boiler And Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG, and NF, 1998 edition including 2000 Addenda.

Table A.1.4.5-1
Key Design Parameters of the NUHOMS®-32PTH1 System

Parameter	32PTH1 DSC Type		
	32PTH1-S	**32PTH1-M**	**32PTH1-L**
DSC Length (in)	185.75 (Maximum)	193.00 (Maximum)	198.50 (Maximum)
DSC Outside Diameter (in)	69.75	69.75	69.75
DSC Cavity Length (in)	164.*38*	17*1.63*	181.*38*
Basket Length (in)	162.00	169.00	178.75
Basket Diameter (in)	68.50	68.50	68.50

Note: Unless stated otherwise, nominal values are provided.

Table A.1.4.5-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-32PTH1 DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged unconsolidated B&W 15x15, WE 17x17, CE 15x15, WE 15x15, CE 14x14, WE 14x14 and CE 16x16 class PWR assemblies (with or without control components) that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.5-4. Reload fuel manufactured by the same or other vendors but enveloped by the design characteristics listed in Table A.1.4.5-4 is also acceptable. Damaged fuel assemblies beyond the definition contained below are not authorized for transport.
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 damage in the fuel assembly is to be limited such that a fuel assembly is able to be handled by normal means. *Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.*
RECONSTITUTED FUEL ASSEMBLIES: • Maximum No. of Reconstituted Assemblies per DSC with Irradiated Stainless Steel Rods • Maximum No. of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly • Maximum No. of Reconstituted Assemblies per DSC with Unlimited Number of Low Enriched UO_2 Rods, or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods	4 10 32
Control Components (CCs)	• Up to 32 CCs are authorized for storage in 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs. • Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), and Neutron Source Assemblies (NSAs), and Neutron Sources • Design basis thermal and radiological characteristics for the CCs are listed in Table A.1.4.5-3.
No. of Intact Assemblies	≤32
No. and Location of Damaged Assemblies	Up to 16 damaged fuel assemblies. Balance may be intact fuel assemblies, or dummy assemblies which are authorized for storage in 32PTH1 DSC. Damaged fuel assemblies are to be placed in the center 16 locations as shown in Figure A.1.4.5-1, Figure A.1.4.5-2 and Figure A.1.4.5-3. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.
Maximum Assembly plus CC Weight	1715 lbs

Table A.1.4.5-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-32PTH1 DSC

(concluded)

THERMAL/RADIOLOGICAL PARAMETERS:	
Fuel Assembly Average Burnup and minimum Cooling Time(1)	Per Table A.1.4.5-5; Table A.1.4.5-8, Table A.1.4.5-8A and decay heat and burnup credit restrictions below.
Decay Heat(1)	Per Figure A.1.4.5-1 or Figure A.1.4.5-2 or Figure A.1.4.5-3.
Burnup Credit Restrictions(1)	Per Table A.1.4.5-8 for Intact Fuel Assemblies and Per Table A.1.4.5-8A for Damaged Fuel Assemblies. *The maximum cooling time shall not exceed 160 years.*

Note:
(1) Minimum cooling time is the longer of that given in Table A.1.4.5-5; that calculated via the decay heat equation given in Table A.1.4.5-9 based on the restrictions provided in Figures A.1.4.5-1, A.1.4.5-2, or A.1.4.5-3; and Table A.1.4.5-8 or Table A.1.4.5-8A.

Table A.1.4.5-3
Thermal and Radiological Characteristics for Control Components Transported in the NUHOMS® -32PTH1 DSC

Parameter	BPRAs, NSAs, CRAs, RCCAs, VSIs, APSRAs, and Neutron Sources	TPAs and ORAs
Maximum Gamma Source (γ/sec/assembly)	3.90E+13	4.19E+12
Decay Heat (Watts/assembly)	8.0	8.0

Table A.1.4.5-4
PWR Fuel Assembly Design Characteristics for the NUHOMS®-32PTH1 DSC

Assembly Class		**B&W 15x15**	**WE 17x17**	**CE 15x15**	**WE 15x15**	**CE 14x14**	**WE 14x14**	**CE 16x16**
Max Unirradiated Length (in)(1)	32PTH1-S	162.6	162.6	162.6	162.6	162.6	162.6	162.6
	32PTH1-M	170.0	170.0	170.0	170.0	170.0	170.0	170.0
	32PTH1-L	178.3	178.3	178.3	178.3	178.3	178.3	178.3
Fissile Material		UO_2	UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Maximum MTU/Assembly(2)		0.49	0.482	0.482	0.482	0.482	0.482	0.482
Maximum Number of Fuel Rods		208	264	216	204	176	179	236
Maximum Number of Guide/ Instrument Tubes		17	25	9	21	5	17	5

Notes:
(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.

Table A.1.4.5-5
PWR Fuel Qualification Table for NUHOMS®-32PTH1 DSC
(Minimum required years of cooling time after reactor core discharge)

BU GWD/ MTU	Assembly Average Initial U-235 Enrichment, wt. %																																											
	0.7	0.8	0.9	1.0	1.1	1.2	1.3	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	4.5	4.6	4.7	4.8	4.9	5.0
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
15	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
20	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
28									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
30									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
32									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
34									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
36									10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
38									13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
39									14.5	13.5	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
40									15.5	14.5	13.5	12.5	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
41									17.0	15.5	14.5	13.5	12.5	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
42																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
43																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
44																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
45																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
46																					10.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
47																					11.5	11.5	11.0	11.0	11.0	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	10.0	10.0	10.0	10.0	10.0	10.0
48																					13.0	12.0	12.0	12.0	12.0	11.5	11.5	11.5	11.5	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	10.0	10.0
49																								12.5	12.5	12.5	12.5	12.0	12.0	12.0	12.0	12.0	11.5	11.5	11.5	11.5	11.5	11.0	11.0	11.0	11.0	11.0	11.0	11.0
50																								13.5	13.5	13.5	13.0	13.0	13.0	13.0	12.5	12.5	12.5	12.5	12.0	12.0	12.0	12.0	12.0	12.0	11.5	11.5	11.5	11.5
51																								14.5	14.5	14.0	14.0	14.0	14.0	13.5	13.5	13.5	13.5	13.0	13.0	13.0	13.0	13.0	12.5	12.5	12.5	12.5	12.5	12.5
52																									15.5	15.0	15.0	15.0	15.0	14.5	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
53																									16.5	16.5	16.0	16.0	16.0	15.5	15.5	15.5	15.0	15.0	15.0	15.0	14.5	14.5	14.5	14.5	14.5	14.5	14.0	14.0
54																										17.5	17.0	17.0	17.0	17.0	16.5	16.5	16.0	16.0	16.0	15.5	15.5	15.5	15.5	15.5	15.0	15.0	15.0	15.0
55																										18.5	18.0	18.0	18.0	17.5	17.5	17.5	17.5	17.0	17.0	17.0	16.5	16.5	16.5	16.5	16.0	16.0	16.0	16.0
56																										19.5	19.0	19.0	19.0	19.0	18.5	18.5	18.0	18.0	18.0	18.0	17.5	17.5	17.5	17.5	17.0	17.0	17.0	17.0
57																												20.0	20.0	20.0	19.5	19.5	19.5	19.0	19.0	19.0	19.0	19.0	19.0	18.5	18.0	18.0	18.0	18.0
58																												21.0	21.0	21.0	20.5	20.5	20.5	20.5	20.5	20.0	20.0	19.5	19.5	19.5	19.0	19.0	19.0	19.0
59																												22.0	22.0	22.0	21.5	21.5	21.5	21.5	21.5	21.5	21.0	20.5	20.5	20.5	20.5	20.0	20.0	20.0
60																												23.5	23.0	23.0	23.0	23.0	23.0	22.5	22.0	22.0	22.0	22.0	21.5	21.5	21.5	21.5	21.5	21.0
61																												24.5	24.0	24.0	24.0	24.0	24.0	23.5	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0
62																												25.5	25.0	25.0	25.0	24.5	24.5	24.5	24.5	24.5	24.0	24.0	23.5	23.5	23.5	23.5	23.0	23.0

Not Analyzed

Note: Next page provides the explanatory notes and limitations regarding the use of this table.

Notes, Table A.1.4.5-5:

- BU = 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 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 either less than 0.7 or greater than 5.0 wt.% U-235 is unacceptable for Transport.
- Fuel with a burnup greater than 62 GWd/MTU is unacceptable for transport.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transport after 10-years cooling.
- Example: An assembly with an initial enrichment of 4.85 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for transport after 10-year cooling time as defined by 4.8 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).
- Even though cooling times less than 15 years are shown in this table, the minimum cooling time requirement for criticality from Table A.1.4.5-8 *and Table A.1.4.5-8A* for transportation is 15 years.

Table A.1.4.5-6
B10 Specification for the NUHOMS®-32PTH1 Poison Plates

32PTH1 DSC Basket Type	Minimum B10 Areal Density for Boral® (mg/cm^2)	Minimum B10 Areal Density for B-Al(1) (mg/cm^2)
1A or 2A	9.0	7.0
1B or 2B	19.0	15.0
1C or 2C	25.0	20.0
1D or 2D	N/A	32.0
1E or 2E	N/A	50.0

Note:

(1) B-Al = Metal Matrix Composites and Borated Aluminum Alloys.

Table A.1.4.5-7
Maximum Allowable Heat Load for the NUHOMS®-32PTH1 System

System Configuration	32PTH1 DSC Type	32PTH1 Basket Type[(1),(2)]	Max. Heat Load (kW) per DSC
1	32PTH1-S, 32PTH1-M or 32PTH1-L	1A, 1B, or 1C or 1D or 1E	26.0 (HLZC 1 and 2, with intact or damaged fuel)
			24.0 (HLZC 3 with intact or damaged fuel)
2	32PTH1-S, 32PTH1-M or 32PTH1-L	2A, 2B, or 2C or 2D or 2E	24.0 (HLZC 2)
			24.0 (HLZC 3)

Notes:

(1) Basket Type 1 (1A, 1B, 1C, 1D, 1E) has aluminum transition rails in the DSC basket.

(2) Basket Type 2 (2A, 2B, 2C, 2D, 2E) has steel transition rails in the DSC basket.

Table A.1.4.5-8
Acceptable Average Initial Enrichment/Minimum Burnup Combinations - NUHOMS®-32PTH1 – *Intact Fuel Assemblies*

(Part 1 of 2)

Enrichment (wt. % U-235)	***WE 17x17, WE 15x15, BW 15x15, CE 14x14, CE 15x15 and CE 16x16 fuel assembly classes***									
	Type A	***Type B***	***Type C***	***Type D***	***Type E***	***Type A***	***Type B***	***Type C***	***Type D***	***Type E***
1.45	*fresh*	-	-	-	-	*fresh*	-	-	-	-
1.55	-	*fresh*	-	-	-	-	*fresh*	-	-	-
1.60	-	-	*fresh*	-	-	-	-	*fresh*	-	-
1.70	-	-	-	*fresh*	-	-	-	-	*fresh*	-
1.80	-	-	-	-	*fresh*	-	-	-	-	*fresh*
	Burnup (GWD/MTU), 15 years decay					***Burnup (GWD/MTU), 30 years decay***				
2.00	*20*	*16*	*14*	*11*	*7*	*19*	*15*	*13*	*9*	*6*
2.25	*23*	*19*	*19*	*17*	*14*	*20*	*19*	*18*	*15*	*12*
2.50	*29*	*22*	*20*	*19*	*19*	*24*	*20*	*19*	*19*	*18*
2.75	*31*	*27*	*25*	*22*	*20*	*29*	*24*	*23*	*20*	*19*
3.00	*36*	*31*	*30*	*26*	*23*	*32*	*28*	*27*	*24*	*20*
3.25	*39*	*33*	*32*	*30*	*27*	*35*	*31*	*30*	*28*	*24*
3.50	*41*	*38*	*36*	*32*	*30*	*39*	*34*	*33*	*31*	*28*
3.75	*45*	*40*	*39*	*36*	*32*	*41*	*37*	*35*	*33*	*31*
4.00	*50*	*43*	*42*	*39*	*35*	*44*	*39*	*39*	*36*	*33*
4.20	-	*46*	*44*	*41*	*38*	*46*	*41*	*40*	*38*	*35*
4.40	-	-	*46*	*43*	*39*	*49*	*44*	*42*	*39*	*37*
4.60	-	-	*49*	*45*	*41*	-	*46*	*44*	*40*	*39*
4.80	-	-	-	*47*	*43*	-	*49*	*47*	*43*	*40*
5.00	-	-	-	*50*	*45*	-	-	*50*	*45*	*42*

Table A.1.4.5-8
Acceptable Average Initial Enrichment/Minimum Burnup Combinations - NUHOMS®-32PTH1 – *Intact Fuel Assemblies*

(*Part 2 of 2*)

Enrichment (wt. % U-235)	WE 14x14 assembly class					
	Type A	Type B	Type C	Type A	Type B	Type C
1.70	fresh	-	-	fresh	-	-
1.85	-	fresh	-	-	fresh	-
1.90	-	-	fresh	-	-	fresh
	Burnup (GWD/MTU), 15 years decay			Burnup (GWD/MTU), 30 years decay		
2.00	11	6	5	10	5	5
2.25	17	12	10	16	10	9
2.50	19	17	15	19	16	14
2.75	22	19	19	20	19	18
3.00	25	21	20	24	20	19
3.25	30	25	23	28	24	21
3.50	32	29	26	31	26	24
3.75	35	31	30	33	30	28
4.00	39	34	32	36	31	31
4.20	40	36	34	38	36	32
4.40	42	39	37	39	37	34
4.60	45	40	39	41	38	36
4.80	48	42	40	43	39	39
5.00	50	44	42	45	41	40

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 conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted).*
- *Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt.% U-235 and 5.00 wt.% U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.*
- *Extrapolation shall not be performed to determine burnup requirements.*
- *The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.*
- *An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.*

Table A.1.4.5-8*A*
Acceptable Average Initial Enrichment/Minimum Burnup Combinations - NUHOMS®-32PTH1 – *Damaged Fuel Assemblies*

(Part 1 of 2)

Enrichment (wt. % U-235)	***WE 17x17, WE 15x15, BW 15x15, CE 14x14, CE 15x15 and CE 16x16 fuel assembly classes***									
	Type A	***Type B***	***Type C***	***Type D***	***Type E***	***Type A***	***Type B***	***Type C***	***Type D***	***Type E***
1.50	*fresh*	-	-	-	-	*fresh*	-	-	-	-
1.60	-	*fresh*	-	-	-	-	*fresh*	-	-	-
1.65	-	-	*fresh*	-	-	-	-	*fresh*	-	-
1.75	-	-	-	*fresh*	-	-	-	-	*fresh*	-
1.80	-	-	-	-	*fresh*	-	-	-	-	*fresh*
	Burnup (GWD/MTU), 15 years decay					***Burnup (GWD/MTU), 30 years decay***				
2.00	*23*	*19*	*19*	*15*	*12*	*19*	*18*	*16*	*13*	*10*
2.25	*28*	*23*	*20*	*19*	*18*	*23*	*19*	*19*	*19*	*17*
2.50	*31*	*28*	*26*	*23*	*21*	*29*	*25*	*22*	*20*	*19*
2.75	*37*	*32*	*31*	*28*	*25*	*33*	*30*	*28*	*25*	*22*
3.00	*41*	*37*	*35*	*33*	*30*	*37*	*33*	*31*	*29*	*26*
3.25	*44*	*41*	*39*	*36*	*33*	*40*	*37*	*35*	*32*	*31*
3.50	*49*	*45*	*43*	*39*	*37*	*44*	*39*	*39*	*35*	*33*
3.75	-	*49*	*47*	*43*	*40*	*48*	*42*	*41*	*39*	*37*
4.00	-	-	*50*	*46*	*43*	-	*46*	*44*	*41*	*39*
4.20	-	-	-	*49*	*46*	-	*49*	*47*	*44*	*41*
4.40	-	-	-	-	*50*	-	-	*50*	*47*	*44*
4.60	-	-	-	-	-	-	-	-	*50*	*47*
4.80	-	-	-	-	-	-	-	-	-	*50*
5.00	-	-	-	-	-	-	-	-	-	-

Table A.1.4.5-8A
Acceptable Average Initial Enrichment/Minimum Burnup Combinations - NUHOMS®-32PTH1 – Damaged Fuel Assemblies
(Part 2 of 2)

Enrichment (wt. % U-235)	WE 14x14 assembly class									
	Type A	Type B	Type C	Type D	Type E	Type A	Type B	Type C	Type D	Type E
1.70	fresh	-	-	-	-	fresh	-	-	-	-
1.85	-	fresh	-	-	-	-	fresh	-	-	-
1.90	-	-	fresh	-	-	-	-	fresh	-	-
1.75	-	-	-	fresh	-	-	-	-	fresh	-
1.80	-	-	-	-	fresh	-	-	-	-	fresh
	Burnup (GWD/MTU), 15 years decay					Burnup (GWD/MTU), 30 years decay				
2.00	20	18	16	15	12	19	16	14	13	10
2.25	26	20	19	19	18	22	19	19	19	17
2.50	31	26	24	23	21	28	23	21	20	19
2.75	35	31	29	28	25	31	28	26	25	22
3.00	39	35	34	33	30	35	32	31	29	26
3.25	43	39	38	36	33	39	35	34	32	31
3.50	47	42	40	39	37	41	39	38	35	33
3.75	-	47	44	43	40	47	41	40	39	37
4.00	-	-	48	46	43	50	45	43	41	39
4.20	-	-	-	49	46	-	48	46	44	41
4.40	-	-	-	-	50	-	-	50	47	44
4.60	-	-	-	-	-	-	-	-	50	47
4.80	-	-	-	-	-	-	-	-	-	50
5.00	-	-	-	-	-	-	-	-	-	-

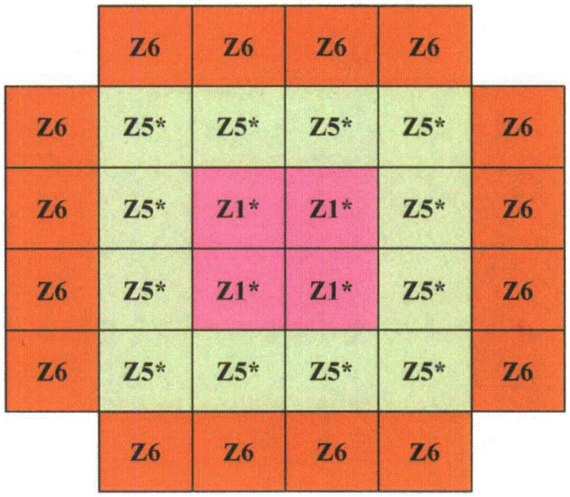
Notes:

- Use burnup and enrichment to lookup minimum cooling time in years. Licensee is responsible for ensuring that uncertainties in fuel enrichment and burnup are conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted).
- Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt.% U-235 and 5.00 wt.% U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.
- Extrapolation shall not be performed to determine burnup requirements.
- The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.
- *An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.*

Table A.1.4.5-9
PWR Decay Heat for Heat Load Configurations

The Decay Heat (DH) in watts is expressed as:
$F1 = -44.8 + 41.6*X1 - 37.1*X2 + 0.611*X1^2 - 6.80*X1*X2 + 24.0*X2^2$
$DH = F1*Exp(\{[1-(1.8/X3)]* -0.575\}*[(X3-4.5)^{0.169}]*[(X2/X1)^{-0.147}]) + 20$
where,
F1 Intermediate Function
X1 Assembly Burnup in GWD/MTU
X2 Initial Enrichment in wt. % U-235
X3 Cooling Time in Years (minimum 10 years)

Note: Even though cooling times less than 15 years are shown in this table, the minimum cooling time requirement for criticality from Table A.1.4.5-8 *and Table A.1.4.5-8A* for transportation is 15 years.

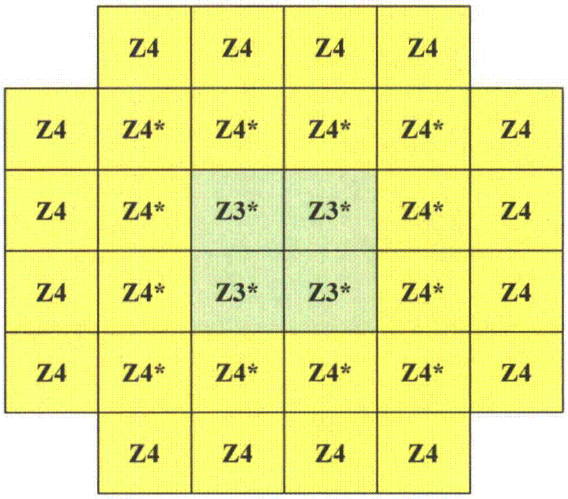


* Denotes only locations where damaged fuel assembly can be transported

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)[(1)(2)]	0.6	NA	NA	NA	1.3[(3)]	1.5
Maximum Decay Heat per Zone (kW)	2.4	NA	NA	NA	15.6	24.0
Maximum Decay Heat per DSC (kW)	26.0[(4)]					

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.5-9.
(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.
(3) 1.2 kW per FA is the maximum decay heat allowed for damaged fuel assemblies.
(4) Adjust payload to maintain 26.0 kW/DSC heat load.

Figure A.1.4.5-1
Heat Load Zoning Configuration No. 1 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 Baskets)

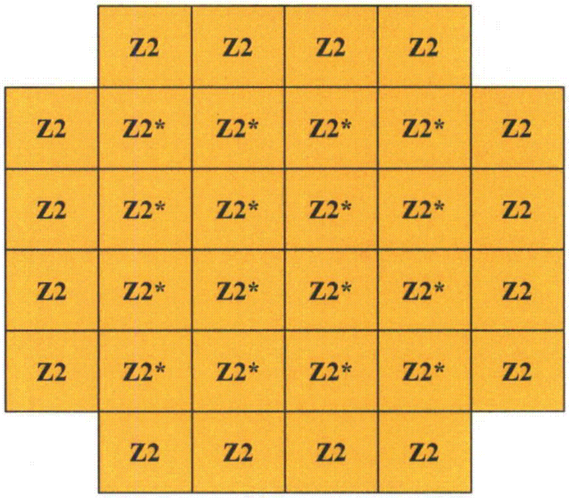


* Denotes only locations where damaged fuel assembly can be transported

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)(1)(2)	NA	NA	0.96	0.98	NA	NA
Maximum Decay Heat per Zone (kW)	NA	NA	3.84	26.0(3)	NA	NA
Maximum Decay Heat per DSC (kW)	26.0(3)					

(1) Decay heat per fuel assembly shall be determined Table A.1.4.5-9.
(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.
(3) Maximum listed is for Type 1 Basket Only. Type 2 Basket shall be limited to 24.0 kW.
(4) Adjust payload to maintain these maximum per DSC heat load.

Figure A.1.4.5-2
Heat Load Zoning Configuration No. 2 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 or Type 2 Baskets)



* Denotes only locations where damaged fuel assembly can be transported

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)[(1)(2)]	NA	0.8	NA	NA	NA	NA
Maximum Decay Heat per Zone (kW)	NA	24.0	NA	NA	NA	NA
Maximum Decay Heat per DSC (kW)	24.0[(3)]					

[(1)] Decay Heat per fuel assembly shall be determined Table A.1.4.5-9.

[(2)] If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by heat output of CC.

[(3)] Adjust payload to maintain 24.0 kW/DSC heat load.

Figure A.1.4.5-3
Heat Load Zoning Configuration No. 3 for 32PTH1-S, 32PTH1-M and 32PTH1-L DSCs
(Type 1 or Type 2 Baskets)

Appendix A.1.4.6
NUHOMS®-37PTH DSC

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LIST OF TABLES

LIST OF FIGURES

Appendix A.1.4.6
NUHOMS®-37PTH DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.6.4.

A.1.4.6.1 NUHOMS®-37PTH DSC Description

Each NUHOMS®-37PTH DSC consists of a DSC shell assembly and a basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* As shown in Table A.1.4.6-1, the 37PTH DSC system consists of two design configurations as follows:

- 37PTH-S, Short Canister
- 37PTH-M, Medium Canister

Table A.1.4.6-1 provides the overall lengths and outer diameters for each 37PTH DSC configuration. The shell assemblies are high integrity stainless steel welded pressure vessels that provide confinement of radioactive materials, encapsulate the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed), and provide biological shielding (in axial direction). The 37PTH DSCs have double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 37PTH DSCs. The top end closure welds are made after fuel loading. Both top plug penetrations (siphon and vent ports) are redundantly sealed after the 37PTH DSC drying operations are complete.

The canister is designed to contain its fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails attached to the inside of the transport cask.

A.1.4.6.2 NUHOMS®-37PTH DSC Fuel Basket

The basket structures are designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall lengths and diameters of the baskets for each canister configuration are provided in Table A.1.4.6-1. The details of the 37PTH fuel baskets are shown in the drawings in Section A.1.4.10.7 of Appendix A.1.4.10. The 37PTH baskets are designed to accommodate 37 intact, or up to 4 damaged with the remainder intact, PWR fuel assemblies with or without Control Components. The basket structure consists of a welded assembly of stainless steel *plates or tubes that accommodate aluminum and/or poison plates* and surrounded by support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel grid. The basket is laterally supported by the basket rails and the canister shell. The stainless steel and aluminum basket rails are oriented parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

*S*hear key*s*, welded to the inner wall of the DSC, mate with notch*es* in the basket support rails to prevent the basket from rotating during normal operations.

Each fuel compartment accommodates aluminum and/or absorbing poison plates. The poison plates are constructed from borated aluminum, or an aluminum/B4C metal matrix composite with a minimum B10 areal density of 0.020 gm/cm^2, and provide a heat conduction path along with the aluminum from the fuel assemblies to the canister wall, as well as criticality control. Alternatively, Boral® can be employed as the poison material, with a minimum B10 areal density of 0.025 gm/cm^2.

A.1.4.6.3 NUHOMS®-37PTH DSC Contents

Each of the two alternate DSC configurations is designed to transport intact (including reconstituted) and/or damaged PWR fuel assemblies as specified in Table A.1.4.6-2 and Table A.1.4.6-4. The fuel to be transported is limited to a maximum assembly average initial enrichment of 5.0 wt. % U-235. The maximum allowable assembly average burnup is limited to 62 GWd/MTU and the minimum cooling time *requirements are given in Table A.1.4.6-2*. Each of the DSC types is designed to transport Control Components (CCs) with thermal and radiological characteristics as listed in Table A.1.4.6-3. The CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), Neutron Source Assemblies (NSAs) and Neutron Sources.

Reconstituted assemblies containing up to 10 replacement irradiated stainless steel rods or stainless steel clad rods per assembly or an unlimited number of lower enrichment UO_2 rods, or Zircaloy (including other Zirconium based alloy) rods or Zr pellets, or unirradiated stainless steel rods are acceptable for storage in the 37PTH DSC as intact fuel assemblies. The stainless steel rods are assumed to have two-thirds the irradiation time as the remaining fuel rods of the assembly. The reconstituted UO_2 rods are assumed to have the same irradiation history as the entire fuel assembly. The nominal volume of the replacement rods is equivalent to the replaced fueled rods in the active fuel region of the fuel assembly. The reconstituted rods can be at any location in the fuel assemblies. The maximum number of reconstituted fuel assemblies per DSC is four with irradiated stainless steel replacement rods or 37 with UO_2 replacement rods.

The NUHOMS®-37PTH DSCs can also accommodate up to a maximum of four damaged fuel assemblies placed in the four cells of the DSC shown in Figure A.1.4.6-1. 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 damage in the fuel assembly is to be limited such that a fuel assembly is able to be handled by normal means. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.

A 37PTH DSC containing less than 37 fuel assemblies may contain dummy fuel assemblies in the empty slots. The dummy assemblies are unirradiated, stainless steel encased structures that approximate the weight and center of gravity of a fuel assembly.

A.1.4.6.4 References

1. American Society of Mechanical Engineers, ASME Boiler And Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG and NF, 2004 Edition thru 2006 Addenda.

Table A.1.4.6-1
Key Design Parameters of the NUHOMS®-37PTH System

Parameter	37PTH DSC Type	
	37PTH-S	37PTH-M
DSC Length (in)	182.00 (Maximum)	189.25 (Maximum)
DSC Outside Diameter (in)	69.75	69.75
DSC Cavity Length (in)	164.38	171.63
Basket Length (in)	162.00	169.00
Basket Diameter (in)	68.50	68.50

Note: Unless stated otherwise, nominal values are provided.

Table A.1.4.6-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-37PTH DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged unconsolidated WE 17x17, CE 15x15, WE 15x15, CE 14x14, WE 14x14 and CE 16x16 class PWR assemblies (with or without control components) that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.6-4. Reload fuel manufactured by same or other vendors but enveloped by the design characteristics listed in Table A.1.4.6-4 is also acceptable. Damaged fuel assemblies beyond the definition contained below are not authorized for storage.
Fuel Damage	Damaged PWR fuel assemblies are assemblies containing missing or partial fuel rods or fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly is to be limited such that a fuel assembly is able to be handled by normal means. *Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.*
RECONSTITUTED FUEL ASSEMBLIES: • Maximum No. of Reconstituted Assemblies per DSC with Irradiated Stainless Steel Rods	4
• Maximum No. of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly	10
• Maximum No. of Reconstituted Assemblies per DSC with Unlimited Number of Low Enriched UO_2 Rods, or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods	37
Control Components (CCs)	• Up to 37 CCs are authorized for storage in 37PTH-S, and 37PTH-M DSCs. • Authorized CCs include Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Assemblies (TPAs), Control Rod Assemblies (CRAs), Rod Cluster Control Assemblies (RCCAs), Axial Power Shaping Rod Assemblies (APSRAs), Orifice Rod Assemblies (ORAs), Vibration Suppression Inserts (VSIs), and Neutron Source Assemblies (NSAs), and Neutron Sources • Design basis thermal and radiological characteristics for the CCs are listed in Table A.1.4.6-3.
No. of Intact Assemblies	≤37
No. and Location of Damaged Assemblies	Up to 4 damaged fuel assemblies. Balance may be intact fuel assemblies, or dummy assemblies which are authorized for storage in 37PTH DSC. Damaged fuel assemblies are to be placed in the four corner locations as shown in Figure A.1.4.6-1. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.
Maximum Assembly plus CC Weight	1665 lbs for 37PTH-S 1625 lbs for 37PTH-M

Table A.1.4.6-2
PWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-37PTH DSC
(concluded)

THERMAL/RADIOLOGICAL PARAMETERS:	
Fuel Assembly Average Burnup and minimum Cooling Time(1)	Per Table A.1.4.6-5; Table A.1.4.6-6 and decay heat and burnup credit restrictions below.
Decay Heat(1)	Per Figure A.1.4.6-1
Burnup Credit Restrictions(1)	Per Table A.1.4.6-6 *The maximum cooling time shall not exceed 160 years.*

Note:
(1) Minimum cooling time is the longer of that given in Table A.1.4.6-5; that calculated via the decay heat equation given in Table A.1.4.6-7 based on the restrictions provided in Figure A.1.4.6-1; and Table A.1.4.6-6.

Table A.1.4.6-3
Thermal and Radiological Characteristics for Control Components Transported in the NUHOMS® -37PTH DSC

Parameter	BPRAs, NSAs, CRAs, RCCAs, VSIs, APSRAs, and Neutron Sources	TPAs and ORAs
Maximum Gamma Source (γ/sec/assembly)	3.90 E+13	4.19 E+12
Decay Heat (Watts/assembly)	8.0	8.0

Table A.1.4.6-4
PWR Fuel Assembly Design Characteristics for the NUHOMS®-37PTH DSC

Assembly Class		**WE 17x17**	**CE 15x15**	**WE 15x15**	**CE 14x14**	**WE 14x14**	**CE 16x16**
Max Unirradiated Length (in)(1)	37PTH-S	162.6	162.6	162.6	162.6	162.6	162.6
	37PTH-M	170.0	170.0	170.0	170.0	170.0	170.0
Fissile Material		UO_2	UO_2	UO_2	UO_2	UO_2	UO_2
Maximum MTU/Assembly(2)		0.482	0.482	0.482	0.482	0.482	0.482
Maximum Number of Fuel Rods		264	216	204	176	179	236
Maximum Number of Guide/ Instrument Tubes		25	9	21	5	17	5

Notes:
(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.

Table A.1.4.6-5
PWR Fuel Qualification Table for NUHOMS®-37PTH DSC

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

BU	Assembly Average Initial U-235 Enrichment, wt. %																																											
GWD/ MTU	0.7	0.8	0.9	1.0	1.1	1.2	1.3	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	4.5	4.6	4.7	4.8	4.9	5.0
10	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
15	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
20	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
25									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
28									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
30									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
32									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
34									10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
36									13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
38									15.0	14.0	13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
39									16.5	15.5	14.0	13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
40									17.5	16.5	15.5	14.0	13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
41									18.5	17.5	16.5	15.5	14.5	13.5	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
42																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
43																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
44																					10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
45																					10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
46																					11.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
47																					13.0	11.5	11.0	11.0	11.0	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
48																					14.0	13.0	12.0	12.0	12.0	11.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
49																								12.5	12.5	12.5	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50																								13.5	13.5	13.5	13.0	12.0	11.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
51																								14.5	14.5	14.0	14.0	13.0	12.0	11.0	10.5	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
52																									15.5	15.0	15.0	14.0	13.0	12.0	11.5	11.0	11.0	11.0	11.0	10.5	10.5	10.5	10.5	10.5	10.5	10.0	10.0	10.0
53																									16.5	16.5	16.0	15.0	14.0	13.0	12.5	12.0	11.5	11.5	11.5	11.5	11.5	11.0	11.0	11.0	11.0	11.0	11.0	10.5
54																										17.5	17.0	16.0	15.0	14.5	13.5	12.5	12.5	12.5	12.5	12.0	12.0	12.0	12.0	12.0	11.5	11.5	11.5	11.5
55																										18.5	18.0	17.5	16.5	15.5	14.5	13.5	13.5	13.0	13.0	13.0	13.0	12.5	12.5	12.5	12.5	12.5	12.0	12.0
56																										19.5	19.0	18.5	17.5	16.5	15.5	14.5	14.0	14.0	14.0	13.5	13.5	13.5	13.5	13.5	13.5	13.0	13.0	13.0
57																												19.5	18.5	17.5	17.0	16.0	15.0	15.0	15.0	14.5	14.5	14.5	14.5	14.0	14.0	14.0	14.0	13.5
58																												20.5	20.0	19.0	18.0	17.0	16.0	16.0	15.5	15.5	15.5	15.5	15.0	15.0	15.0	14.5	14.5	14.5
59																												22.0	21.0	20.0	19.0	18.0	17.5	17.0	16.5	16.5	16.5	16.0	16.0	16.0	16.0	15.5	15.5	15.5
60																												23.0	22.0	21.5	20.5	19.5	18.5	17.5	17.5	17.5	17.5	17.0	17.0	17.0	16.5	16.5	16.5	16.5
61																												24.5	23.5	22.5	21.5	20.5	19.5	19.0	18.5	18.5	18.0	18.0	18.0	18.0	17.5	17.5	17.5	17.5
62																												25.5	24.5	23.5	23.0	22.0	21.0	20.0	19.5	19.5	19.5	19.0	19.0	19.0	18.5	18.5	18.5	18.5

Not Analyzed

Note: Next page provides the explanatory notes and limitations regarding the use of this table.

Notes, Table A.1.4.6-5:

- BU = 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 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 either less than 0.7 or greater than 5.0 wt.% U-235 is unacceptable for Transport.
- Fuel with a burnup greater than 62 GWd/MTU is unacceptable for transport.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transport after 10-years cooling.
- Example: An assembly with an initial enrichment of 4.85 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for transport after 10-year cooling time as defined by 4.8 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).
- Even though cooling times less than 15 years are shown in this table, the minimum cooling time requirement for criticality from Table A.1.4.6-6 is 15 years.

Table A.1.4.6-6
Acceptable Average Initial Enrichment / Minimum Burnup Combinations - NUHOMS®-37PTH – *Intact and Damaged Fuel Assemblies*

Enrichment (wt. % U-235)	***WE 17x17, WE 15x15, CE 14x14, CE 15x15 and CE 16x16 assembly classes***		***WE 14x14 assembly class***
1.65	*fresh*	*fresh*	*-*
1.90	*-*	*-*	*fresh*
	Burnup (GWD/MTU), 15 years decay	***Burnup (GWD/MTU), 30 years decay***	***Burnup (GWD/MTU), 15 years decay***
2.00	*14*	*12*	*5*
2.25	*19*	*18*	*10*
2.50	*20*	*19*	*15*
2.75	*25*	*22*	*19*
3.00	*30*	*27*	*20*
3.25	*32*	*31*	*24*
3.50	*37*	*32*	*28*
3.75	*39*	*36*	*31*
4.00	*42*	*39*	*33*
4.20	*44*	*40*	*35*
4.40	*47*	*42*	*38*
4.60	*50*	*44*	*39*
4.80	*-*	*47*	*40*
5.00	*-*	*50*	*43*

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 conservatively applied in determination of actual values for these parameters (uncertainty in enrichment to be added and uncertainty in burnup to be subtracted)*
- *Interpolation can be performed to determine the burnup for enrichment values (between 2.00 wt. % U-235 and 5.00 wt. % U-235) that are not explicitly shown herein. Alternatively, the burnup value corresponding to the next higher enrichment may be utilized.*
- *Extrapolation shall not be performed to determine burnup requirements.*
- *The burnup of the "fresh" assemblies is 0. For a given configuration, the enrichment corresponding to "fresh" in this Table is the maximum enrichment above which a burnup value is needed for fuel assemblies to qualify for transportation.*
- *An additional burnup of 3 GWD/MTU is required for loading fuel assemblies with control rod insertion deeper than 20 cm inside the active fuel during depletion.*

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Table A.1.4.6-7
PWR Assembly Decay Heat for Heat Load Configurations[1]

The Decay Heat (DH) in watts is expressed as:

$$F1 = -44.8 + 41.6*X1 - 37.1*X2 + 0.611*X1^2 - 6.80*X1*X2 + 24.0*X2^2$$
$$DH = F1*Exp(\{[1-(1.8/X3)]* -0.575\}*[(X3-4.5)^{0.169}]*[(X2/X1)^{-0.147}]) + 20$$

where,

F1 Intermediate Function
X1 Assembly Burnup in GWD/MTU
X2 Initial Enrichment in wt. % U-235
X3 Cooling Time in Years (minimum 10 years)

Note 1: Even though a minimum cooling time of 10 years is used, the minimum cooling time requirement for criticality from Table A.1.4.6-6 is 15 years.

		Z4	Z4	Z4		
	Z4*	Z3	Z3	Z3	Z4*	
Z4	Z3	Z2	Z2	Z2	Z3	Z4
Z4	Z3	Z2	Z1	Z2	Z3	Z4
Z4	Z3	Z2	Z2	Z2	Z3	Z4
	Z4*	Z3	Z3	Z3	Z4*	
		Z4	Z4	Z4		

* Denotes only locations where damaged fuel assembly can be transported

	Zone 1	Zone 2	Zone 3	Zone 4
Maximum Decay Heat (kW/FA)(1)(2)	0.4	0.4	0.6	0.7
Maximum Decay Heat per Zone (kW)	0.4	3.2	7.2	11.2
Maximum Decay Heat per DSC (kW)	22.0			

(1) Decay Heat per fuel assembly shall be determined per Table A.1.4.6-7.

(2) If storing a CC with the fuel assemblies, reduce allowable decay heat (DH) by 8 watts.

Figure A.1.4.6-1
Heat Load Zoning Configuration No. 1 for 37PTH DSCs

Appendix A.1.4.7
NUHOMS®-61BT DSC

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Appendix A.1.4.7
NUHOMS®-61BT DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.7.4.

A.1.4.7.1 NUHOMS®-61BT DSC Description

Each NUHOMS®-61BT DSC consists of a DSC shell assembly and a basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* The *maximum* length and the outer diameter of the 61BT DSC *are* approximately *196.0* inches and 67.3 inches respectively. The shell assembly is a high integrity stainless steel welded pressure vessel that provides confinement of radioactive materials, encapsulates the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed, and provides biological shielding (in axial direction). The 61BT DSC has double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 61BT DSC. The top plug penetrations (siphon and vent ports) are redundantly sealed after the 61BT DSC drying operations are complete.

The canister is designed to contain the fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails attached to the inside surface of the aluminum inner sleeve of the MP197HB Transport Cask.

A.1.4.7.2 NUHOMS®-61BT Fuel Basket

The basket structure is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall length and outer diameter of the basket, including the hold down ring, is approximately 178.*5* inches and 66.0 inches respectively. The details of the 61BT fuel baskets are shown in the drawings in Section A.1.4.10.8 of Appendix A.1.4.10. The 61BT basket is designed to accommodate 61 intact, or up to 16 damaged, with the remainder intact, BWR fuel assemblies with or without fuel channels. The basket structure consists of a welded assembly of stainless steel tubes (fuel compartments) separated by poison plates and surrounded by larger stainless steel boxes and support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not on the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel structural boxes. The basket is laterally supported by the basket rails and the canister shell. The stainless steel basket rails are oriented parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

A shear key, welded to the inner wall of the DSC, mates with a notch in one of the basket support rails to prevent the basket from rotating during normal operations. Also a hold down ring is installed above the basket to prevent the basket from moving axially during transport.

The poison plates are constructed from borated aluminum, or an aluminum/B4C metal matrix composite (MMC), or Boral® and provide a heat conduction path from the fuel assemblies to the canister wall, as well as the necessary criticality control.

A.1.4.7.3 NUHOMS®-61BT DSC Contents

The NUHOMS®-61BT DSC is designed to transport 61 intact, or up to 16 damaged and the remainder intact, for a total of 61, standard BWR fuel assemblies with or without fuel channels. The NUHOMS®-61BT DSC can transport intact or damaged BWR fuel assemblies with the characteristics described in Table A.1.4.7-1. Damaged BWR fuel assemblies are fuel assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks.

The NUHOMS®-61BT DSC may transport BWR fuel assemblies with a maximum decay heat of 300 watts/assembly, or a total of 18.3 kW. *The heat load zoning configuration for NUHOMS®-61BT DSC is uniform as shown in Figure A.1.4.7-1.*

The design characteristics of fuel assemblies considered are listed in Table A.1.4.7-2

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

Intact BWR fuel assemblies may be transported in any of the three NUHOMS®-61BT DSC Types provided the loading meets the maximum lattice average enrichment limit for the NUHOMS®-61BT DSC type, as given on Table A.1.4.7-3. Damaged BWR fuel assemblies may only be transported in Type C NUHOMS®-61BT DSCs with end caps installed on each four compartment assembly, where a damaged fuel assembly is authorized.

Fuel assemblies with various combinations of burnup, enrichment and cooling time can be transported in the NUHOMS®-61BT DSC as long as the fuel assembly parameters fall within the design limits specified in Table A.1.4.7-1, Table A.1.4.7-3, and Table A.1.4.7-4.

A.1.4.7.4 References

1. American Society of Mechanical Engineers, ASME Boiler and Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG and NF, 1998 edition including 1999 Addenda.

Table A.1.4.7-1
BWR Fuel Specification for Fuel to be Transported in the NUHOMS®-61BT DSC

PHYSICAL PARAMETERS:	
Fuel Design	Intact or damaged unconsolidated 7x7, 8x8, 9x9, or 10x10 intact BWR fuel assemblies manufactured by General Electric or Exxon/ANF or reload fuel manufactured by the same or other vendors that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.7-2.
Fuel Damage(3)	Damaged BWR fuel assemblies are 7x7 and 8x8 fuel assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of cladding damage in the fuel rods is to be limited such that a fuel assembly needs to be handled by normal means. Damaged fuel may only be transported in the "Type C" NUHOMS®-61BT Canister. Damaged fuel is restricted to the 7x7 and 8x8 designs only. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Channels	Fuel may be transported with or without fuel channels, channel fasteners, or finger springs
No. of Intact Assemblies	≤61
No. and Location of Damaged Assemblies	Up to sixteen (16) damaged fuel assemblies may be accommodated in the four corner 2x2 compartment assemblies with endcaps installed on each end of the compartment.
Maximum Assembly plus fuel channel weight	705 lbs
THERMAL/RADIOLOGICAL PARAMETERS(1): Maximum Initial ^{235}U Enrichment (wt. %)	Per Table A.1.4.7-3
Fuel Assembly Average Burnup and minimum Cooling Time(1)(4)	Per Table A.1.4.7-4 and decay heat restrictions below
Decay Heat(1)(2)	0.300 kW/Assembly calculated per Table A.1.4.7-5

(1) Minimum cooling time is the longer of that given in Table A.1.4.7-4; that calculated via the decay heat equation given in Table A.1.4.7-5 to meet the 0.300 kW/assembly limit.
(2) For FANP9 9x9-2 fuel assemblies, the maximum decay heat is limited to 0.21 kW/assembly.
(3) For damaged fuel assemblies, the maximum initial lattice average enrichment is limited to 4.4 wt.% U-235, respectively.
(4) An additional cooling time of 8 years is required for damaged fuel assemblies in addition to that obtained from Table A.1.4.7-4, when 5 or more damaged fuel assemblies are loaded.

Table A.1.4.7-2
BWR Fuel Assembly Design Characteristics (1) (2)

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]	**9x9-79/2**
Fuel Type	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	FANP9 9x9-2
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	5.44
Fissile Material	UO_2	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	79
Number of Water Holes	0	1	2	4	1	2	2	0	1[4]	4[4]	2
Maximum Initial Uranium Content (kg)	*198*	*192*	*192*	*192*	*192*	*192*	*192*	*198*	*198*	*192*	*192*

(1) Any fuel channel average thickness up to 0.120 inch is acceptable on any of the fuel designs.
(2) Maximum fuel assembly unirradiated length is 176.2 inch.
(3) Includes ENC III-E and ENC III-F.
(4) Solid Zirc rods instead of water holes.
(5) May be transported as damaged fuel.

Table A.1.4.7-3
BWR Fuel Assembly Poison Material Design Requirements

NUHOMS®-61BT DSC Type	Maximum Lattice Average Enrichment(1) (wt. % U-235)	Minimum B10 Content in Borated Aluminum or MMC Poison Plates (gm/cm^2)	Minimum B10 Content in Boral® Poison Plates (gm/cm^2)
For Intact Fuel Assemblies			
A	3.7	0.021	0.025
B	4.1	0.032	0.038
C	4.4	0.040	0.048
For Damaged Fuel Assemblies (upto 4 Damaged Fuel Assemblies)			
C	4.4	0.040	0.048
For Damaged Fuel Assemblies (5 to 16 Damaged Fuel Assemblies)			
C	3.2	0.040	0.048

(1) Maximum pin enrichment is 5.0 wt. % U-235 in all cases.

Table A.1.4.7-4
BWR Fuel Qualification Table for the NUHOMS®-61BT DSC

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

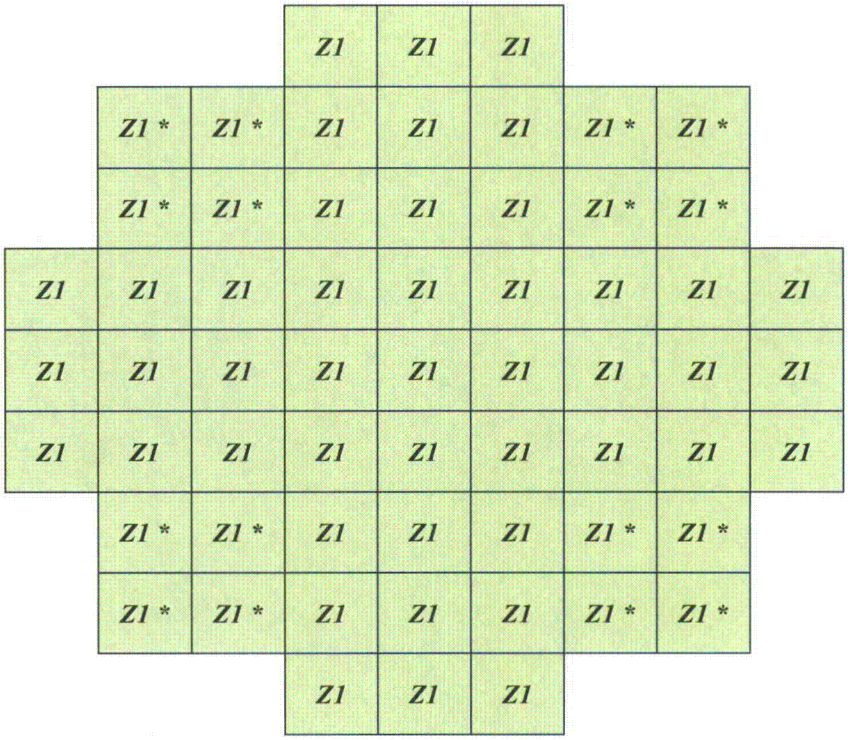
BU (GWd/ MTU	Initial Enrichment																														
	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4
10	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
15	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7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

- 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 transportation.
- Fuel with a burnup greater than 40 GWd/MTU is unacceptable for transportation.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transportation after 7 years cooling.
- Example: An assembly with an initial enrichment of 4.15 wt.% U-235 and a burnup of 31.5 GWd/MTU is acceptable for transport after a 7-year year cooling time as defined by 4.1 wt. % U-235 (rounding down) and 32 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).
- *When loading five or more damaged fuel assemblies per DSC, an additional cooling time of 8 years is required for only damaged fuel assemblies.*

Table A.1.4.7-5
BWR Assembly Decay Heat for Heat Load Configurations

The Decay Heat (DH) in watts is expressed as:
$F1 = -59.1 + 23.4*X1 - 21.1*X2 + 0.280*X1^2 - 3.52*X1*X2 + 12.4*X2^2$ $DH = F1*Exp(\{[1-(1.2/X3)]* -0.720\}*[(X3-4.5)^{0.157}]*[(X2/X1)^{-0.132}]) + 10$
where, F1 Intermediate Function X1 Assembly Burnup in GWD/MTU X2 Initial Enrichment in wt. % U-235 X3 Cooling Time in Years (minimum 7 years)

Note: Even though a minimum cooling time of 7 years is used, the minimum cooling time requirement with five or more damaged fuel assemblies from shielding requirements is per Table A.1.4.7-4.



** Denotes only locations where damaged fuel assembly can be transported*

	Zone 1
Maximum Decay Heat (kW/FA)[(1)]	*0.30*
Maximum Decay Heat per Zone (kW)	*18.3*
Maximum Decay Heat per DSC (kW)	*18.3*

[(1)]Decay heat per fuel assembly shall be determined per Table A.1.4.7-5.

Figure A.1.4.7-1
Heat Load Zoning Configuration for 61BT DSCs

Appendix A.1.4.8
NUHOMS®-61BTH DSC

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LIST OF FIGURES

Appendix A.1.4.8
NUHOMS®-61BTH DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.8.4.

A.1.4.8.1 NUHOMS®-61BTH DSC Description

Each NUHOMS®-61BTH DSC consists of a DSC shell assembly and basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* The 61BTH DSC system consists of three design configurations, depending upon the type of fuel and heat load, as follows:

- 61BTH Type 1
- 61BTH Type 2
- 61BTHF, accommodates up to 4 Failed Fuel Cans with Failed Fuel

Table A.1.4.8-1 provides the overall lengths and outer diameters for each 61BTH DSC configuration. The shell assemblies are high integrity stainless steel welded pressure vessels that provide confinement of radioactive materials, encapsulate the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed), and provide biological shielding (in the axial direction). The 61BTH DSCs have double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 61BTH DSCs. The top end closure welds are made after fuel loading. Both top plug penetrations (siphon and vent ports) are redundantly sealed after the 61BTH DSC drying operations are complete.

The canister is designed to contain its fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal conditions, the canister rests on four canister rails attached to the inside surface of the aluminum inner sleeve of the transport cask.

A.1.4.8.2 NUHOMS®-61BTH DSC Fuel Basket

The basket structure is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall lengths and outer diameters of the baskets, including the hold down rings, are provided in Table A.1.4.8-1. The details of the 61BTH fuel baskets are shown in the drawings in Section A.1.4.10.9 of Appendix A.1.4.10. The 61BTH baskets are designed to accommodate 61 intact, or up to 16 damaged with up to four (4) Failed Fuel Cans (FFCs) loaded with failed fuel with the remainder intact BWR fuel assemblies with or without fuel channels. The basket structure consists of a welded assembly of stainless steel tubes (fuel compartments) separated by poison plates and surrounded by larger stainless steel boxes and support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel structural boxes. The basket is laterally supported by the basket rails and the canister shell. The stainless steel basket rails are oriented parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

The failed fuel assemblies are to be placed in individual Failed Fuel Cans (FFCs). Each FFC is constructed of sheet metal and is provided with a welded bottom closure and a removable top closure which allows lifting of the FFC with the enclosed damaged assembly/debris. The FFC is provided with screens at the bottom and top to contain fuel debris and allow fill/drainage of water from the FFC during loading operations. The FFC is protected by the fuel compartment tubes and its only function is to confine the failed fuel.

*S*hear key*s*, welded to the inner wall of the DSC, mate with notch*es* in the basket support rails to prevent the basket from rotating during normal operations. Also a hold down ring is installed above the basket to prevent the basket from moving axially during transport.

The NUHOMS®-61BTH DSC is designed with six alternate basket configurations based on the boron content in the poison plates as listed in Table A.1.4.8-4 or Table A.1.4.8-5 (designated as "A" for the poison plates with the lowest B10 loading to "F" for the highest B10 loading). Three alternate poison materials are allowed: (a) Borated Aluminum alloy, (b) Boron Carbide/Aluminum Metal Matrix Composite (MMC), or (c) Boral®. The poison plates provide a heat conduction path from the fuel assemblies to the canister wall, as well as the necessary criticality control.

A.1.4.8.3 NUHOMS®-61BTH DSC Contents

Each of the NUHOMS®-61BTH DSC Type 1 and Type 2 configurations is designed to transport intact (including reconstituted) and/or damaged BWR fuel assemblies as specified in Table A.1.4.8-2 and Table A.1.4.8-3. In addition, the 61BTHF can transport up to four failed fuel assemblies placed in Failed Fuel Cans as described in Table A.1.4.8-2. The fuel to be transported is limited to a maximum lattice average initial enrichment of 5.0 wt. % ^{235}U. The maximum allowable fuel assembly average burnup is limited to 62 GWd/MTU and the minimum cooling time *requirement is given in Table A.1.4.8-2.*

Reconstituted fuel assemblies containing up to four replacement irradiated stainless steel rods per assembly or 61 lower enrichment UO_2 rods instead of Zircaloy clad enriched UO_2 rods are acceptable for storage in 61BTH DSCs as intact fuel assemblies. The stainless steel rods are assumed to have two-thirds the irradiation time as the remaining fuel rods of the assembly. The reconstituted UO_2 rods are assumed to have the same irradiation history as the entire fuel assembly. The reconstituted rods can be at any location in the fuel assemblies. The maximum number of reconstituted fuel assemblies per DSC is four with irradiated stainless steel rods or 61 with UO_2 rods or Zr rods or Zr pellets or unirradiated stainless steel rods.

The NUHOMS®-61BTH DSCs can also accommodate up to a maximum of 16 damaged fuel assemblies placed in the 2x2 compartments located at the outer edge of the DSC as shown in Figure A.1.4.8-9. Damaged BWR 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 damage in the fuel rods is to be limited such that the fuel assembly will still be able to be handled by normal means. Missing fuel rods are allowed. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.

The NUHOMS®-61BTHF DSC, an alternative version of NUHOMS®-61BTH DSC discussed in Section A.1.4.8.2 is designed to accommodate up to a maximum of four failed fuel assemblies in *f*ailed *f*uel *c*ans placed in cells located at the outer edge of the DSC as shown in Figure A.1.4.8-9. Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly cannot be handled by normal means.

Fuel debris and damaged fuel rods that have been removed from a damaged fuel assembly and placed in a *r*od *s*torage *b*asket are also considered as failed fuel. Loose fuel debris, not contained in a *r*od *s*torage *b*asket may also be placed in a *f*ailed *f*uel *c*an for storage, provided the size of the debris is larger than the *f*ailed *f*uel *c*an screen mesh opening *and it is located at a position of at least 10" above the top of the bottom shield plug of the DSC.*

Fuel debris may be associated with any type of UO_2 fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its content shall be less than 705 lb.

A 61BTH DSC containing less than 61 fuel assemblies may contain dummy fuel assemblies in the empty slots. The dummy assemblies are unirradiated, stainless steel encased structures that approximate the weight and center of gravity of a fuel assembly.

The NUHOMS®-61BTH DSC may transport up to 61 BWR fuel assemblies arranged in any of the eight alternate heat load zoning configurations shown in Figure A.1.4.8-1 through A.1.4.8-8.

A.1.4.8.4 References

1. American Society of Mechanical Engineers, ASME Boiler *a*nd Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG and NF, 1998 edition including 2000 Addenda.

Table A.1.4.8-1
Key Design Parameters of the NUHOMS®-61BTH System

Parameter	61BTH Type 1 DSC	61BTH Type 2 DSC
DSC Length (in.)	196.04 (Maximum)	196.04 (Maximum)
DSC Outside Diameter (in.)	67.25	67.25
DSC Cavity Length (in.)	179.50	179.50
Basket length (including holddown ring) (in.)	178.50	178.50
Basket OD (in.)	66.00	66.00

Note: Unless stated otherwise, nominal values are provided.

Table A.1.4.8-2
BWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-61BTH DSC

(Part 1 of 2)

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged or failed 7x7, 8x8, 9x9 or 10x10 BWR assemblies manufactured by General Electric or Exxon/ANF or FANP or ABB or reload fuel manufactured by same or other vendors that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.8-3. Damaged fuel assemblies beyond the definition contained below are not authorized for transport in damaged fuel locations shown in Figure A.1.4.8-9.
Damaged Fuel	Damaged BWR fuel assemblies are assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel rods is to be limited such that the fuel assembly will still be able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
Failed Fuel	Failed fuel is defined as ruptured fuel rods, severed fuel rods, loose fuel pellets, or fuel assemblies that cannot be handled by normal means. Fuel assemblies may contain breached rods, grossly breached rods, and other defects such as missing or partial rods, missing grid spacers, or damaged spacers to the extent that the assembly can not be handled by normal means. Fuel debris and damaged fuel rods that have been removed from a damaged fuel assembly and placed in a *r*od *s*torage *b*asket are also considered as failed fuel. Loose fuel debris, not contained in a *r*od *s*torage *b*asket may also be placed in a *f*ailed *f*uel *c*an for storage, provided the size of the debris is larger than the *f*ailed *f*uel *c*an screen mesh opening *and it is located at a position of at least 10" above the top of the bottom shield plug of the DSC.* Fuel debris may be associated with any type of UO_2 fuel provided that the maximum uranium content and initial enrichment limits are met. The total weight of each failed fuel can plus all its content shall be less than 705 lb.
RECONSTITUTED FUEL ASSEMBLIES:	
• Maximum No. of Reconstituted Assemblies per DSC with Irradiated Stainless Steel Rods	4
• Maximum No. of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly	4
• Maximum No. of Reconstituted Assemblies per DSC with unlimited number of low enriched UO2 rods or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods	61
No. of Intact Assemblies	≤61

Table A.1.4.8-2
BWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-61BTH DSC

(Part 2 of 2)

No. and Location of Damaged Assemblies	Up to 16 damaged fuel assemblies, with balance intact or dummy assemblies, are authorized for transport in 61BTH DSC. Damaged fuel assemblies may only be transported in the 2x2 compartments as shown in Figure A.1.4.8-9. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.	
No. and Location of Failed Assemblies	Up to 4 failed fuel assemblies. Balance may be intact and/or damaged fuel assemblies, empty slots, or dummy assemblies depending on the specific heat load zoning configuration. Failed fuel assemblies are to be placed as shown in Figure A.1.4.8-9. Failed fuel assembly/fuel debris is to be encapsulated in an individual *f*ailed *f*uel *c*an (FFC) provided with a welded bottom closure and a removable top closure.	
Channels	Fuel may be transported with or without channels, channel fasteners, or finger springs.	
Maximum Assembly Weight with Channels	705 lb	
THERMAL/RADIOLOGICAL PARAMETERS(1): Maximum Initial ^{235}U Enrichment (wt. %)	Per Table A.1.4.8-4 or Table A.1.4.8-5.	
Fuel Assembly Average Burnup and minimum Cooling Time(2)	Type 1 Per Table A.1.4.8-6.	
	Type 2 Per Table A.1.4.8-7.	
Decay Heat per DSC	≤22.0 kW for Type 1 DSC, per Figures A.1.4.8-1 through A.1.4.8-4	
	≤24.0 kW for Type 2 DSC, per Figures A.1.4.8-1 through A.1.4.8-8	
Minimum B10 Content in Poison Plates	Per Table A.1.4.8-4 or Table A.1.4.8-5.	

(1) Minimum cooling time is the longer of that given in Table A.1.4.8-6, Table A.1.4.8-7, and that calculated via the decay heat equation given in Table A.1.4.8-8 based on the restrictions provided in Figures A.1.4.8-1 through A.1.4.8-8.

(2) An additional cooling time of 8 years is required for damaged fuel assemblies *(and failed fuel assemblies, if applicable)* in addition to that obtained from Table A.1.4.8-6 or Table A.1.4.8-7, when 5 or more damaged fuel assemblies *(or a combination of damaged and failed fuel assemblies, if applicable)* are loaded.

Table A.1.4.8-3
BWR Fuel Assembly Design Characteristics(1) for the NUHOMS®-61BTH DSC

Transnuclear ID	Initial Design or Reload Fuel Designation	Max Length (in) (Unirradiated)	Fissile Material	Maximum No. of Fuel Rods	*Maximum Initial Uranium Content (kg)*
7x7-49/0	GE1 GE2 GE3	176.6	UO_2	49	*198*
8x8-63/1	GE4	176.6	UO_2	63	*192*
8x8-62/2	GE-5 GE-Pres GE-Barrier GE8 Type I	176.6	UO_2	62	*192*
8x8-60/4	GE8 Type II	176.6	UO_2	60	*192*
8x8-60/1	GE9 GE10	176.6	UO_2	60	*192*
9x9-74/2	GE11 GE13	176.6	UO_2	74	*192*
10x10-92/2	GE12 GE14	176.6	UO_2	92	*192*
7x7-49/0	ENC-IIIA	176.6	UO_2	49	*198*
7x7-48/1Z	ENC-III(2)	176.6	UO_2	48	*198*
8x8-60/4Z	ENC Va ENC Vb	176.6	UO_2	60	*192*
8x8-62/2	FANP 8x8-2	176.6	UO_2	62	*192*
FANP 9x9	FANP9 9x9(3)	176.6	UO_2	81	*192*
Siemens QFA	9x9	176.6	UO_2	72	*192*
10x10-91/1	ATRIUM 10, ATRIUM 10XM	176.6	UO_2	91	*192*
ABB-8x8	SVEA-64	176.6	UO_2	64	*192*
ABB-10x10	SVEA-100(4)	176.6	UO_2	100	*192*
LaCrosse	Allis Chalmers-10x10 Exxon/ANF 10x10	125	UO_2	100	*125*

(1) Any fuel channel average thickness up to 0.120 inch is acceptable on any of the fuel designs.
(2) Includes ENC-IIIE and ENC-IIIF.
(3) Includes FANP 9x9-72, 9x9-79, 9x9-80, and 9x9-81.
(4) Includes SVEA-92, SVEA-96, SVEA-96+, SVEA-96 OPTIMA, SVEA-96 OPTIMA 2.

Table A.1.4.8-4
BWR Fuel Assembly Initial Lattice Average Enrichment v/s Minimum B10 Requirements for the NUHOMS®-61BTH DSC Poison Plates (Intact Fuel)

61BTH DSC Type	Basket Type	Maximum Lattice Average Enrichment(1) (wt% U-235)	Minimum B10 Areal Density, gram/cm^2	
			Borated Aluminum/MMC	Boral®
1	A	3.7	0.021	0.025
	B	4.1	0.032	0.038
	C	4.4	0.040	0.048
	D	4.6	0.048	0.058
	E	4.8	0.055	0.066
	F	5.0	0.062	0.075
2	A	3.7	0.022	0.027
	B	4.1	0.032	0.038
	C	4.4	0.042	0.050
	D	4.6	0.048	0.058
	E	4.8	0.055	0.066
	F	5.0	0.062	0.075

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

Table A.1.4.8-5
BWR Fuel Assembly Initial Lattice Average Enrichment v/s Minimum B10 Requirements for the NUHOMS®-61BTH DSC Poison Plates (Damaged/Failed Fuel)

<table>
<tr><th rowspan="2">61BTH DSC Type</th><th rowspan="2">Basket Type</th><th colspan="2">Maximum Lattice Average Enrichment (wt% U-235) (1)</th><th colspan="2">Minimum B10 Areal Density, gram/cm²</th></tr>
<tr><th>Up to 4 Damaged Assemblies (2)(3)</th><th>Five or More Damaged Assemblies (16 Maximum) (2)</th><th>Borated Aluminum/MMC</th><th>Boral®</th></tr>
<tr><td rowspan="6">1</td><td>A</td><td>3.7</td><td>2.80</td><td>0.021</td><td>0.025</td></tr>
<tr><td>B</td><td>4.1</td><td>3.10</td><td>0.032</td><td>0.038</td></tr>
<tr><td>C</td><td>4.4</td><td>3.20</td><td>0.040</td><td>0.048</td></tr>
<tr><td>D</td><td>4.6</td><td>3.40</td><td>0.048</td><td>0.058</td></tr>
<tr><td>E</td><td>4.8</td><td>3.50</td><td>0.055</td><td>0.066</td></tr>
<tr><td>F</td><td>5.0</td><td>3.60</td><td>0.062</td><td>0.075</td></tr>
<tr><td rowspan="6">2</td><td>A</td><td>3.7</td><td>2.80</td><td>0.022</td><td>0.027</td></tr>
<tr><td>B</td><td>4.1</td><td>3.10</td><td>0.032</td><td>0.038</td></tr>
<tr><td>C</td><td>4.4</td><td>3.20</td><td>0.042</td><td>0.050</td></tr>
<tr><td>D</td><td>4.6</td><td>3.40</td><td>0.048</td><td>0.058</td></tr>
<tr><td>E</td><td>4.8</td><td>3.50</td><td>0.055</td><td>0.066</td></tr>
<tr><td>F</td><td>5.0</td><td>3.60</td><td>0.062</td><td>0.075</td></tr>
<tr><th rowspan="2">61BTH DSC Type</th><th rowspan="2">Basket Type</th><th colspan="2">Maximum Lattice Average Enrichment (wt% U-235) (1)</th><th colspan="2">Minimum B10 Areal Density, gram/cm²</th></tr>
<tr><th>Up to 4 Failed Assemblies (Corner Locations) (3)(4)</th><th>Up to 4 Failed Assemblies (Corner Locations) and up to 12 Damaged Assemblies (2)(4)</th><th>Borated Aluminum/MMC</th><th>Boral®</th></tr>
<tr><td rowspan="6">2</td><td>A</td><td>3.7</td><td>2.80</td><td>0.022</td><td>0.027</td></tr>
<tr><td>B</td><td>4.0</td><td>3.10</td><td>0.032</td><td>0.038</td></tr>
<tr><td>C</td><td>4.4</td><td>3.20</td><td>0.042</td><td>0.050</td></tr>
<tr><td>D</td><td>4.6</td><td>3.40</td><td>0.048</td><td>0.058</td></tr>
<tr><td>E</td><td>4.8</td><td>3.40</td><td>0.055</td><td>0.066</td></tr>
<tr><td>F</td><td>5.0</td><td>3.50</td><td>0.062</td><td>0.075</td></tr>
</table>

Note

(1) For LaCrosse fuel assemblies, the enrichment shall be reduced by 0.1 wt. % U-235
(2) See Figure A.1.4.8-9 for the location of damaged assemblies within the 61BTH DSC.
(3) Maximum Pellet Enrichment 5.0 wt. % ^{235}U
(4) Failed fuel assemblies are allowed only in the 61BTH Type 2 DSC. See Figure A.1.4.8-9 for the location of failed assemblies within the 61BTH Type 2 DSC.

Table A.1.4.8-6
BWR Fuel Qualification Table for NUHOMS®-61BTH Type 1 DSC

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

BU, GWD/ MTU	Lattice Average Initial U-235 Enrichment, wt %																																
	0.9	1.2	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	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
15	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
20	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
23	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
25	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
28	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
30	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
32				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
34				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
36				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
38				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
39				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
40										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
41										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
42										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
43										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
44										7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
45										11.0	10.5	9.5	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
46										12.0	11.0	10.5	10.0	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
47										13.5	12.5	11.5	10.5	10.5	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
48										15.0	13.5	13.0	12.0	11.0	10.5	9.5	8.5	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
49										16.5	15.0	14.0	13.5	12.0	11.0	10.5	9.5	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
50										17.5	16.5	15.5	14.5	13.5	12.0	11.5	10.5	10.0	9.0	8.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
51										19.0	18.0	17.0	16.0	14.5	13.5	13.0	12.0	10.5	10.5	9.5	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
52										20.5	19.5	18.0	17.5	16.0	15.0	14.0	13.0	12.0	11.0	11.0	10.0	9.0	8.0	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
53										22.0	21.0	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	10.5	9.5	8.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0
54										23.0	22.0	21.0	20.0	19.0	18.0	16.5	16.0	15.0	13.5	12.5	12.0	11.0	10.5	9.5	8.5	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
55										24.5	23.5	22.5	21.5	20.5	19.5	18.0	17.0	16.5	15.0	14.0	13.0	12.5	11.0	10.0	10.0	9.0	8.5	8.0	7.5	7.5	7.5	7.5	7.5	7.5
56										26.0	25.0	24.0	23.0	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	10.5	9.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0
57										27.5	26.5	25.0	24.0	23.0	22.0	21.0	20.0	18.5	18.0	17.0	15.5	15.0	14.0	13.0	12.0	11.0	11.0	10.0	9.0	8.5	8.5	8.0	8.0	8.0
58										28.5	27.5	26.5	25.5	24.5	23.5	22.0	21.5	20.0	19.0	18.0	17.0	16.0	15.0	14.5	13.0	12.0	11.5	10.5	10.0	9.5	8.5	8.5	8.5	8.5
59										30.0	29.0	28.0	27.0	26.0	24.5	24.0	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	10.5	9.5	9.0	9.0	8.5
60										31.5	30.5	29.0	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.5	10.5	10.0	9.0	9.0
61										32.5	31.5	30.5	29.5	28.5	27.5	26.5	25.5	24.5	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.5	14.5	13.5	12.5	11.5	10.5	10.5	9.5
62										34.0	33.0	31.5	31.0	30.0	28.5	27.5	26.5	25.5	24.5	23.5	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	14.0	13.0	12.0	11.0	11.0

Note: Explanatory notes and limitations regarding the use of this table follow Table A.1.4.8-7.

Table A.1.4.8-7
BWR Fuel Qualification Table for NUHOMS®-61BTH Type 2 DSC

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

BU, GWD/ MTU	Lattice Average Initial U-235 Enrichment, wt %																																
	0.9	1.2	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	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
15	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
20	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
23	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
25	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
28	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
30	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
32				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
34				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
36				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
38				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
39				7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
40										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
41										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
42										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
43										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
44										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
45										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
46										7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
47										8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
48										8.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
49										10.5	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
50										10.5	10.0	9.0	9.0	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
51										11.5	11.0	11.0	10.0	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
52										13.5	12.0	11.0	11.0	10.0	9.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
53										14.5	13.5	12.5	11.0	10.5	10.5	9.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
54										16.0	15.0	13.5	12.5	11.5	11.0	10.5	9.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
55										17.0	16.0	15.0	14.0	13.0	12.0	11.0	11.0	10.0	9.0	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
56										18.5	17.0	16.0	15.5	14.5	13.5	12.5	11.0	10.5	10.5	9.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
57										19.5	18.5	17.5	16.5	15.5	14.5	13.5	13.0	12.0	11.0	10.5	9.5	8.5	8.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
58										21.0	20.0	19.0	18.0	17.0	15.5	15.0	14.0	13.0	12.0	11.0	10.5	10.0	9.0	8.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
59										22.5	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.5	13.5	12.5	11.5	10.5	10.5	9.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
60										23.5	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	11.0	10.5	9.5	8.5	8.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0
61										25.0	24.0	22.5	21.5	21.0	19.5	18.5	17.5	17.0	16.0	15.0	13.5	13.0	12.0	11.0	11.0	10.0	9.5	8.5	7.5	7.0	7.0	7.0	7.0	7.0
62										26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.5	13.5	12.5	11.5	10.5	10.5	9.5	8.5	7.5	7.0	7.0	7.0	7.0

Note: Explanatory notes and limitations regarding the use of this table follow Table A.1.4.8-7.

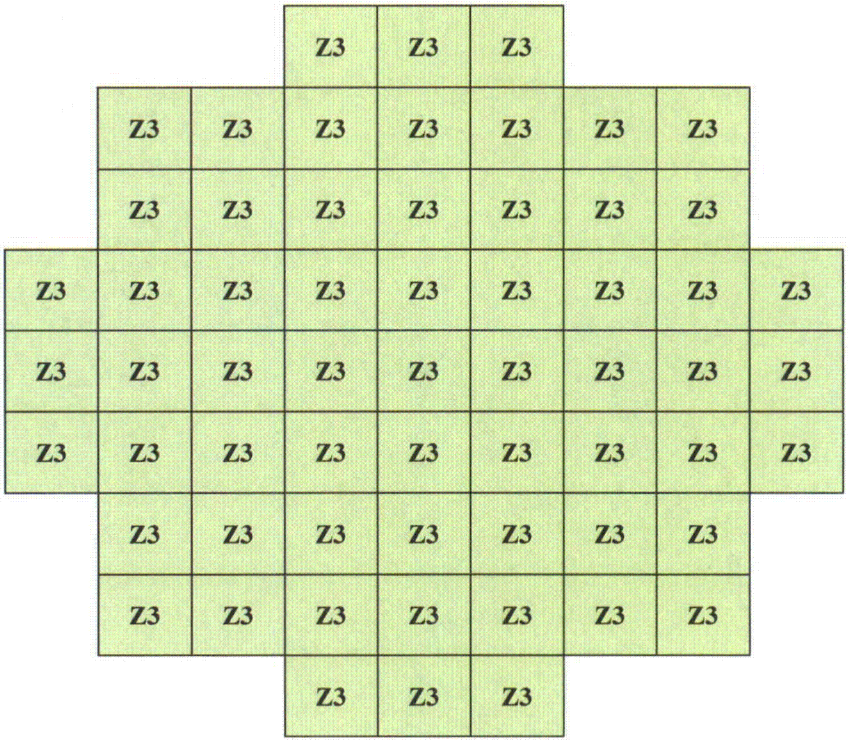
Notes: Tables A.1.4.8-6 and Table A.1.4.8-7:

- Burnup = *a*ssembly *a*verage 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 a lattice average initial enrichment less than 0.9 (or less than the minimum provided above for each burnup) or greater than 5.0 wt.% U-235 is unacceptable for transportation.
- Fuel with a burnup greater than 62 GWd/MTU is unacceptable for transportation.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transportation after 7-years cooling.
- For reconstituted fuel assemblies with irradiated stainless steel rods, increase the cooling time by 1 year for fuel assemblies in the 24 peripheral locations of the canister with cooling times less than 10 years. No adjustment of cooling time is required for fuel assemblies in other locations or for those that have cooled for more than 10 years.
- The cooling times for failed, damaged, and intact assemblies are identical. However, when loading five or more damaged fuel assemblies per DSC *(or a combination of damaged and failed fuel assemblies, if applicable)*, an additional cooling time of 8 years is required for only damaged fuel assemblies *(and failed fuel assemblies, if applicable).*
- Example: An assembly with an initial enrichment of 4.85 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for transport after a 7-year year cooling time as defined by 4.8 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).

Table A.1.4.8-8
BWR Assembly Decay Heat for Heat Load Configurations

The *d*ecay *h*eat (DH) in watts is expressed as: $F1 = -59.1 + 23.4*X1 - 21.1*X2 + 0.280*X1^2 - 3.52*X1*X2 + 12.4*X2^2$ $DH = F1*Exp(\{[1-(1.2/X3)]* -0.720\}*[(X3-4.5)^{0.157}]*[(X2/X1)^{-0.132}]) + 10$ where, F1 Intermediate *f*unction X1 Assembly *b*urnup in GWD/MTU X2 Initial *e*nrichment in wt. % U-235 X3 Cooling *t*ime in *y*ears (minimum 7 years)

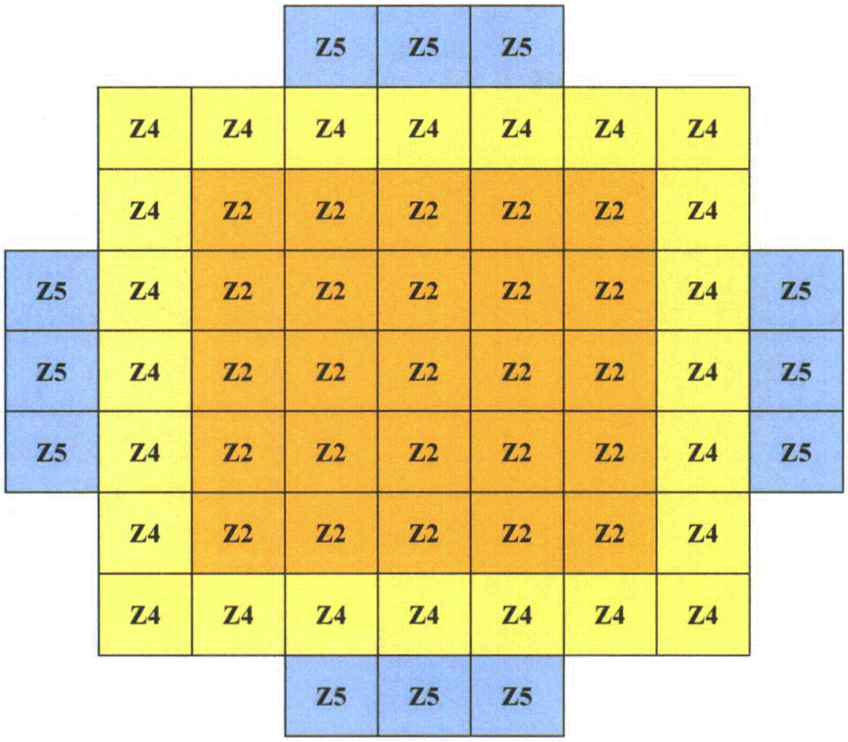
Note: Even though a minimum cooling time of 7 years is used, the minimum cooling time requirement with five or more damaged fuel assemblies *(or a combination of damaged and failed fuel assemblies, if applicable)* from shielding requirements is per Table A.1.4.8-6 for Type 1 DSC and A.1.4.8-7 for Type 2 DSC.



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

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.
(2) This configuration is not allowed for a 61BTH Type 1 basket with MMC or Boral® Poison Plates.
(3) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 15.4 kW per DSC for HLZC No. 1.

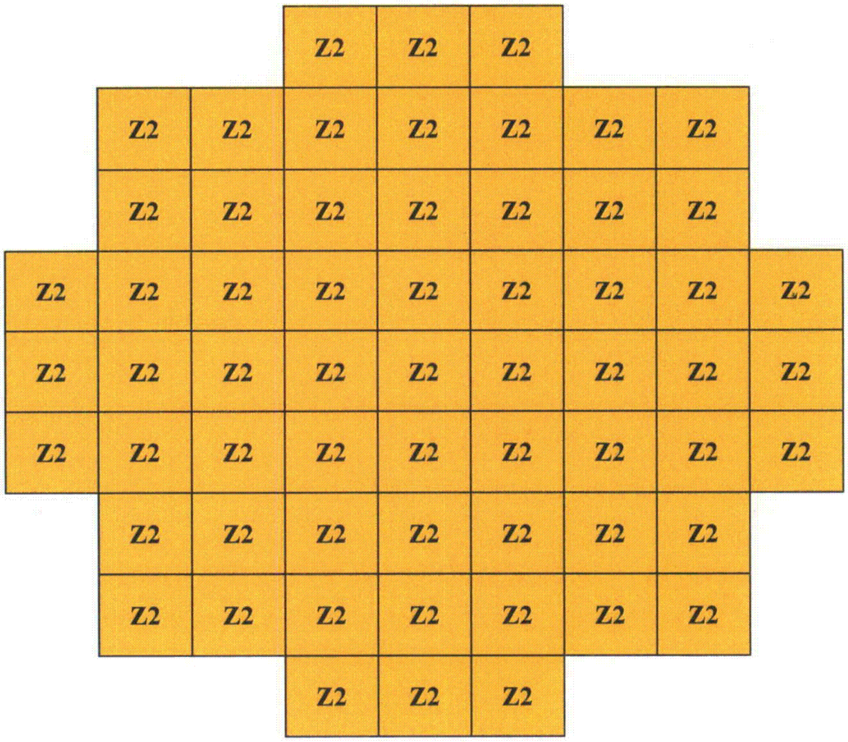
Figure A.1.4.8-1
Heat Load Zoning Configuration No. 1 for Type 1 or Type 2 61BTH DSCs(2)



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

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.
(2) This configuration is not allowed for a 61BTH Type 1 basket with MMC or Boral® Poison Plates.
(3) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 15.4 kW per DSC for HLZC No. 2.

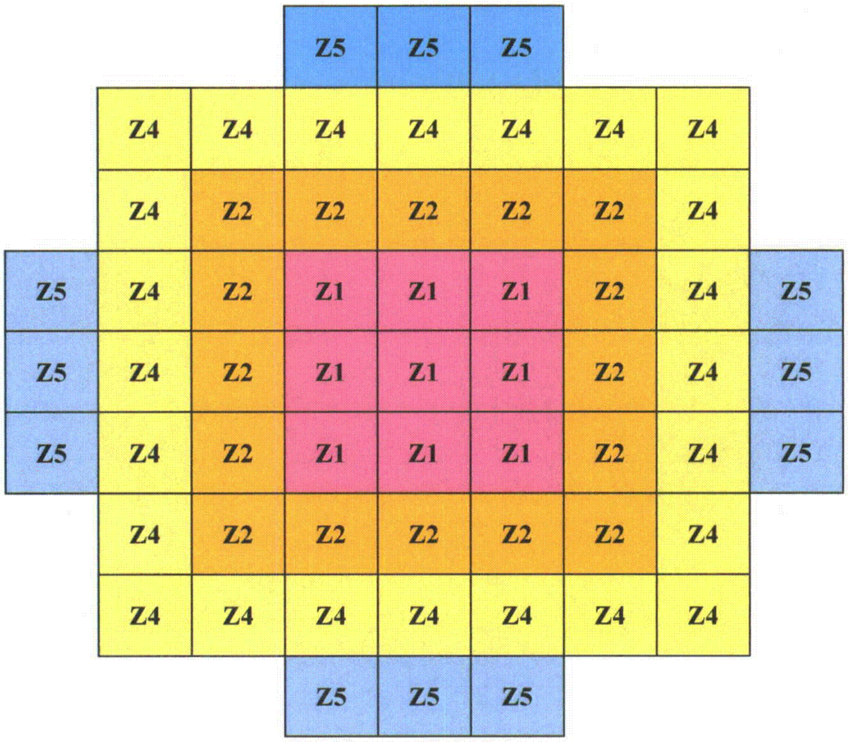
Figure A.1.4.8-2
Heat Load Zoning Configuration No. 2 for Type 1 or Type 2 61BTH DSCs(2)



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

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.
(2) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 13.58 kW per DSC for HLZC No. 3.

Figure A.1.4.8-3
Heat Load Zoning Configuration No. 3 for Type 1 or Type 2 61BTH DSCs

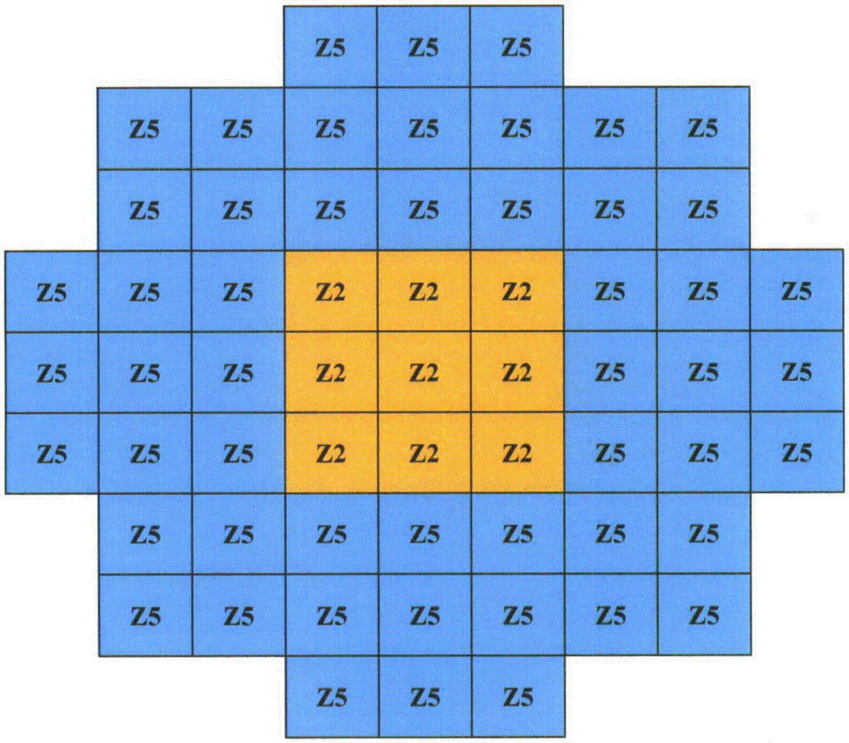


	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)[(1)(2)]	0.22	0.35	NA	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	1.98	5.60	NA	11.52	6.48	NA
Maximum Decay Heat per DSC (kW)	19.4[(2)]					

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.

(2) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 13.58 kW per DSC for HLZC No. 4.

Figure A.1.4.8-4
Heat Load Zoning Configuration No. 4 for Type 1 or Type 2 61BTH DSCs



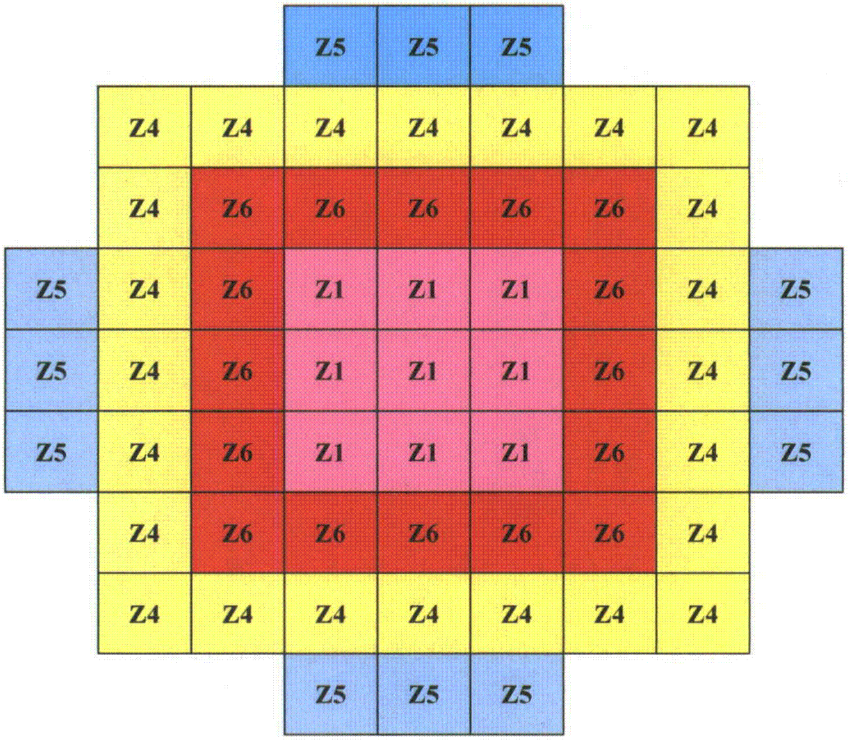
	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**	**Zone 5**	**Zone 6**
Maximum Decay Heat (kW/FA)[(1) (3)]	NA	0.35	NA	NA	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	3.15	NA	NA	24.0	NA
Maximum Decay Heat per DSC (kW)	24.0[(3)]					

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.

(2) This configuration is not allowed for a 61BTH Type 2 basket with MMC or Boral® Poison Plates.

(3) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 16.8 kW per DSC for HLZC No. 5.

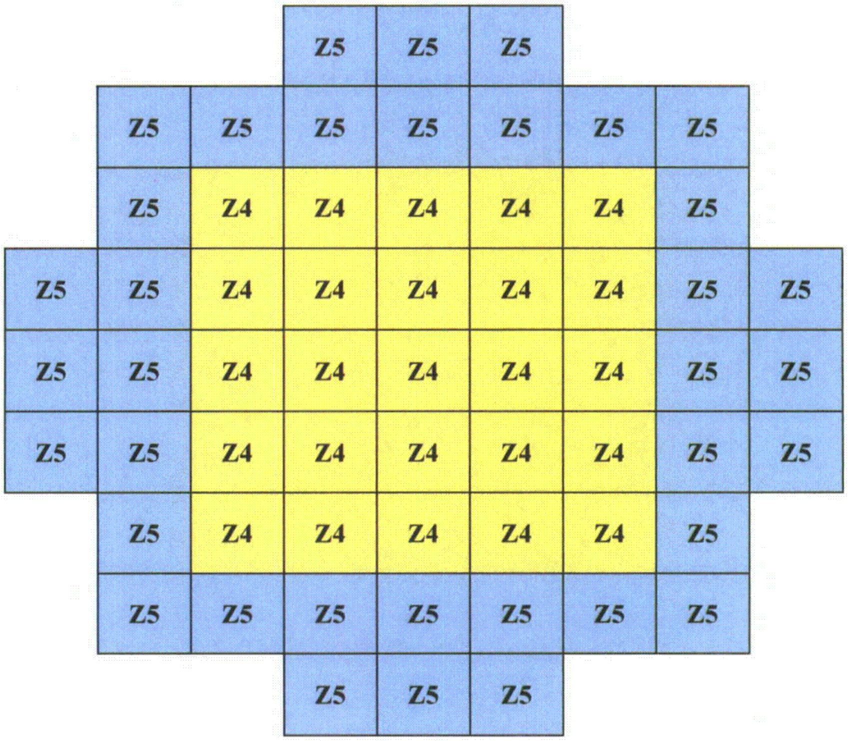
Figure A.1.4.8-5
Heat Load Zoning Configuration No. 5 for Type 2 61BTH DSC[(2)]



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)(1) (3)	0.22	NA	NA	0.48	0.54	0.70
Maximum Decay Heat per Zone (kW)	1.98	NA	NA	11.52	6.48	11.20
Maximum Decay Heat per DSC (kW)	24.0(3)					

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.
(2) This configuration is not allowed for a 61BTH Type 1 basket with MMC or Boral® Poison Plates.
(3) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 16.8 kW per DSC for HLZC No. 6.

Figure A.1.4.8-6
Heat Load Zoning Configuration No. 6 for Type 2 61BTH DSC(2)



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)(1) (3)	NA	NA	NA	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	NA	NA	12.00	19.44	NA
Maximum Decay Heat per DSC (kW)	24.0(3)					

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.

(2) This configuration is not allowed for a 61BTH Type 1 basket with MMC or Boral® Poison Plates.

(3) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 16.8 kW per DSC for HLZC No. 7.

Figure A.1.4.8-7
Heat Load Zoning Configuration No. 7 for Type 2 61BTH DSC(2)

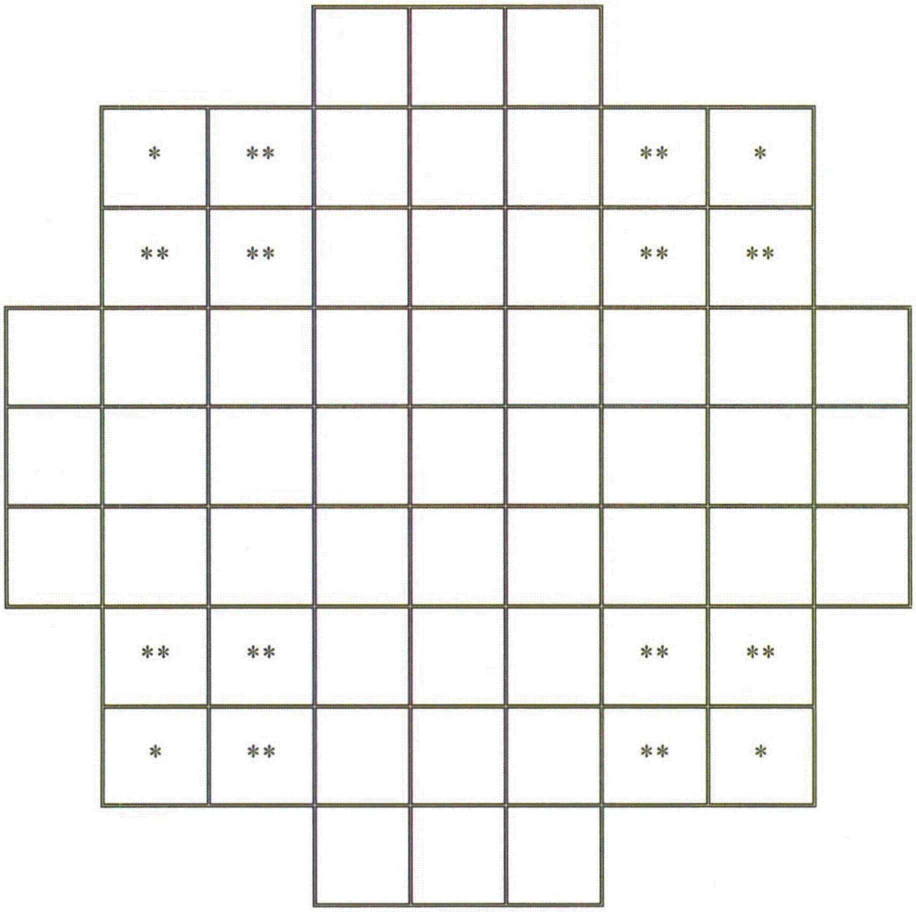
			Z5	Z5	Z5			
	Z4	Z4	Z4	Z4	Z4	Z4	Z4	
	Z4	Z3	Z3	Z3	Z3	Z3	Z4	
Z5	Z4	Z3	Z2	Z2	Z2	Z3	Z4	Z5
Z5	Z4	Z3	Z2	Z2	Z2	Z3	Z4	Z5
Z5	Z4	Z3	Z2	Z2	Z2	Z3	Z4	Z5
	Z4	Z3	Z3	Z3	Z3	Z3	Z4	
	Z4	Z4	Z4	Z4	Z4	Z4	Z4	
			Z5	Z5	Z5			

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Maximum Decay Heat (kW/FA)(1) (2)	NA	0.35	0.393	0.48	0.54	NA
Maximum Decay Heat per Zone (kW)	NA	3.15	6.288	11.52	6.48	NA
Maximum Decay Heat per DSC (kW)	24.0(2)					

(1) Decay heat per fuel assembly shall be determined per Table A.1.4.8-8.

(2) Reduce the maximum decay heat to 70% of the listed values for LaCrosse fuel assembly. The total decay heat for LaCrosse fuel assembly is 16.8 kW per DSC for HLZC No. 8.

Figure A.1.4.8-8
Heat Load Zoning Configuration No. 8 for Type 2 61BTH DSC



*	Corner Locations See Note 1	**	Interior Locations See Note 2

Note 1: These corner locations shall only be used to load up to four damaged or failed assemblies with the remaining intact in a 61BTH Basket. The maximum lattice average initial enrichment of assemblies (damaged or intact transported in the 2x2 compartment assemblies) is limited to the "Up to 4 Damaged Assemblies" column of Table A.1.4.8-5. For the Type 2 DSC containing failed fuel assemblies, this enrichment is limited to the "Up to 4 Failed Assemblies" column of Table A.1.4.8-5.

Note 2: If loading more than four damaged assemblies, place first four damaged assemblies in the corner locations per Note 1, and up to 12 additional damaged assemblies in these interior locations, with the remaining intact in a 61BTH Basket. The maximum lattice average initial enrichment of assemblies (damaged or intact transported in the 2x2 compartment assemblies) is limited to the "Five or More Damaged Assemblies" column of Table A.1.4.8-5. For the Type 2 DSC containing failed fuel assemblies, this enrichment is limited to the "and up to 12 Damaged Assemblies" column of Table A.1.4.8-5.

Figure A.1.4.8-9
Location of Damaged and Failed Fuel Assemblies Inside 61BTH DSC

Appendix A.1.4.9
NUHOMS®-69BTH DSC

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Appendix A.1.4.9
NUHOMS®-69BTH DSC

NOTE: References in this Appendix are shown as [1], [2], etc. and refer to the reference list in Section A.1.4.9.4.

A.1.4.9.1 NUHOMS®-69BTH DSC Description

Each NUHOMS®-69BTH DSC consists of a DSC shell assembly and a basket assembly. The shell assembly consists of a cylindrical shell, the inner cover plates of the top and bottom shield plug assemblies and outer top cover plate. *The DSC shell assembly is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NB [1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13.* The *maximum* length and the outer diameter of the 69BTH DSC *are* approximately 197.0 inches and 69.8 inches, respectively. The shell assembly is a high integrity stainless steel welded pressure vessel that provides confinement of radioactive materials, encapsulates the fuel in an inert atmosphere (the canister is back-filled with helium before being seal welded closed) and provides biological shielding (in axial direction). The 69BTH DSC has double redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the 69BTH DSC. The top plug penetrations (siphon and vent ports) are redundantly sealed after the 69BTH DSC drying operations are complete.

The canister is designed to contain the fuel basket and fuel assemblies, and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails attached to the inside surface of the transport cask.

A.1.4.9.2 NUHOMS®-69BTH Fuel Basket

The basket structure is designed, fabricated and inspected in accordance with ASME B&PV Code Subsection NG[1]. Alternatives to the code are provided in Chapter A.2, Appendix A.2.13.13. The overall length and outer diameter of the basket, including the hold down ring, are approximately 178.6 inches and 68.4 inches respectively. The details of the 69BTH fuel basket is shown in the drawings in Section A.1.4.10.10 of Appendix A.1.4.10. The 69BTH basket is designed to accommodate 69 intact, or up to 24 damaged with the remainder intact BWR fuel assemblies with or without fuel channels. The basket structure consists of a welded assembly of stainless steel tubes (fuel compartments) separated by poison plates and surrounded by larger stainless steel boxes and support rails.

The basket structure is open at each end. Therefore, longitudinal fuel assembly loads are applied directly to the canister/cask body and not the fuel basket structure. The fuel assemblies are laterally supported by the stainless steel structural boxes. The basket is laterally supported by the basket rails and the canister shell. The aluminum basket rails are oriented parallel to the axis of the canister, and are attached to the periphery of the basket to provide support, and to establish and maintain basket orientation.

*S*hear key*s*, welded to the inner wall of the DSC, mate with notch*es* in the basket support rails to prevent the basket from rotating during normal operations. Also a hold down ring is installed above the basket to prevent the basket from moving axially during transport.

The NUHOMS®-69BTH DSC is designed with six alternate basket configurations based on the boron content in the poison plates as listed in Table A.1.4.9-3 (designated as "A" for the poison plates with the lowest B10 loading to "F" for the highest B10 loading). Three alternate poison materials are allowed: (a) Borated Aluminum alloy, (b) Boron Carbide/Aluminum Metal Matrix Composite (MMC), or (c) Boral®. The poison plates provide a heat conduction path from the fuel assemblies to the canister wall, as well as the necessary criticality control.

A.1.4.9.3 NUHOMS®-69BTH DSC Contents

The NUHOMS®-69BTH DSC is designed to transport 69 intact, or up to 24 damaged and the remainder intact, standard BWR fuel assemblies with or without fuel channels. The NUHOMS®-69BTH DSC can transport intact or damaged BWR fuel assemblies with the characteristics described in Table A.1.4.9-1, which include a variety of cooling times, enrichment and maximum bundle average burnup. Damaged BWR fuel assemblies are fuel assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly is to be limited such that the fuel assembly will still be able to be handled by normal means. Missing fuel rods are allowed.

The fuel assemblies considered are listed in Table A.1.4.9-2.

A.1.4.9.4 References

1. American Society of Mechanical Engineers, ASME Boiler And Pressure Vessel Code, Section III, Division 1 - Subsections NB, NG and NF, 2004 edition including 2006 Addenda.

Table A.1.4.9-1
BWR Fuel Specification for the Fuel to be Transported in the NUHOMS®-69BTH DSC

PHYSICAL PARAMETERS: Fuel Class	Intact or damaged 7x7, 8x8, 9x9 or 10x10 BWR assemblies manufactured by General Electric or Exxon/ANF or FANP or ABB or reload fuel manufactured by same or other vendors that are enveloped by the fuel assembly design characteristics listed in Table A.1.4.9-2. Damaged fuel assemblies beyond the definition contained below are not authorized for transport.
Damaged Fuel	Damaged BWR fuel assemblies are assemblies containing fuel rods with known or suspected cladding defects greater than hairline cracks or pinhole leaks. The extent of damage in the fuel assembly is to be limited such that the fuel assembly will still be able to be handled by normal means. Missing fuel rods are allowed. Damaged fuel assemblies shall also contain top and bottom end fittings or nozzles or tie plates depending on the fuel type.
RECONSTITUTED FUEL ASSEMBLIES: • Maximum No. of Reconstituted Assemblies per DSC with Irradiated Stainless Steel Rods • Maximum No. of Irradiated Stainless Steel Rods per Reconstituted Fuel Assembly • Maximum No. of Reconstituted Assemblies per DSC with unlimited number of low enriched UO2 rods or Zr Rods or Zr Pellets or Unirradiated Stainless Steel Rods	 4 4 69
No. of Intact Assemblies	≤69
No. and Location of Damaged Assemblies	Up to 24 damaged fuel assemblies, with balance intact or dummy assemblies, are authorized for transport in 69BTH DSC. Damaged fuel assemblies may only be transported in the four outer "6-compartment" arrays as shown in Figure A.1.4.9-1. The DSC basket cells which accommodate damaged fuel assemblies are provided with top and bottom end caps.
Channels	Fuel may be transported with or without channels, channel fasteners, or finger springs.
Maximum Assembly Weight with Channels	705 lbs
THERMAL/RADIOLOGICAL PARAMETERS: Maximum Initial ^{235}U Enrichment (wt. %)	Per Table A.1.4.9-3.
Allowable Heat Load Zoning Configurations for each 69BTH DSC	Per Figure A.1.4.9-2 or Figure A.1.4.9-3 or Figure A.1.4.9-4 or Figure A.1.4.9-5.
Fuel Assembly Average Burnup and minimum Cooling Time[(1)]	Per Table A.1.4.9-4
Decay Heat per DSC	Per Figure A.1.4.9-2 or Figure A.1.4.9-3 or Figure A.1.4.9-4 or Figure A.1.4.9-5.
Minimum B10 Content in Poison Plates	Per Table A.1.4.9-3.

*[(1)] An additional cooling time of 8 years is required for damaged fuel assemblies in addition to that obtained from Table A.1.4.9-4, when **five** or more damaged fuel assemblies are loaded.*

Table A.1.4.9-2
BWR Fuel Assembly Design Characteristics[(1)] for the NUHOMS®-69BTH DSC

Transnuclear ID	Initial Design or Reload Fuel Designation	Max Length (in) (Unirradiated)	Fissile Material	Maximum No. of Fuel Rods	*Maximum Initial Uranium Content (kg)*
7x7-49/0	GE1 GE2 GE3	176.6	UO_2	49	*198*
8x8-63/1	GE4	176.6	UO_2	63	*192*
8x8-62/2	GE-5 GE-Pres GE-Barrier GE8 Type I	176.6	UO_2	62	*192*
8x8-60/4	GE8 Type II	176.6	UO_2	60	*192*
8x8-60/1	GE9 GE10	176.6	UO_2	60	*192*
9x9-74/2	GE11 GE13	176.6	UO_2	74	*192*
10x10-92/2	GE12 GE14	176.6	UO_2	92	*192*
7x7-49/0	ENC-IIIA	176.6	UO_2	49	*198*
7x7-48/1Z	ENC-III[(2)]	176.6	UO_2	48	*198*
8x8-60/4Z	ENC Va ENC Vb	176.6	UO_2	60	*192*
8x8-62/2	FANP 8x8-2	176.6	UO_2	62	*192*
FANP 9x9	FANP9 9x9[(3)]	176.6	UO_2	81	*192*
Siemens QFA	9x9	176.6	UO_2	72	*192*
10x10-91/1	ATRIUM 10, ATRIUM 10XM	176.6	UO_2	91	*192*
ABB-8x8	SVEA-64	176.6	UO_2	64	*192*
ABB-10x10	SVEA-100[(4)]	176.6	UO_2	100	*192*
LaCrosse	Allis Chalmers-10x10 Exxon/ANF 10x10	125	UO_2	100	*125*

(1) Any fuel channel average thickness up to 0.120 inch is acceptable on any of the fuel designs.
(2) Includes ENC-IIIE and ENC-IIIF.
(3) Includes FANP 9.9-72, 9x9-79, 9x9-80, and 9x9-81.
(4) Includes SVEA-92, SVEA-96, SVEA-96+, SVEA-96 OPTIMA, SVEA-96 OPTIMA 2.

Table A.1.4.9-3
BWR Fuel Assembly Initial Lattice Average Enrichment v/s Minimum B10 Requirements for the NUHOMS®-69BTH DSC Poison Plates

Basket Type	**Maximum Lattice Average Enrichment(1) (wt% U-235)**	**Minimum B10 Areal Density, gram/cm^2**	
		Borated Aluminum/MMC	**Boral®**
A	3.7	*0.021*	*0.025*
B	4.1	*0.031*	*0.037*
C	4.4	*0.039*	*0.047*
D	4.6	*0.046*	*0.055*
E	4.8	*0.053*	*0.064*
F	5.0	*0.061*	*0.073*

	Maximum Lattice Average Initial Enrichment(1) (wt.% U-235)			
Basket Type	Intact Assemblies	Up to 4 Damaged Assemblies(2)	5 to 8 Damaged Assemblies(2)	9 to 24 Damaged Assemblies(2)
A	3.70	3.70	*3.30*	*2.80*
B	4.10	4.10	*3.60*	3.00
C	4.40	4.20	*3.60*	*3.10*
D	4.60	4.40	3.70	3.20
E	4.80	4.40	3.70	3.20
F	5.00	4.80	3.90	*3.40*

(1) For LaCrosse fuel assemblies, the enrichment shall be reduced by 0.1 wt. % U-235.
(2) Allowable locations in basket per Figure A.1.4.9-1.

Table A.1.4.9-4
BWR Fuel Qualification Table for the NUHOMS®-69BTH DSC
(Minimum required years of cooling time after reactor core discharge)

BU, GWD/MTU	Lattice Average Initial U-235 Enrichment, wt %																																
	0.9	1.2	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	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	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
20	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	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
30	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	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
31				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	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
35				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	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
39				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	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
40										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	6.0	6.0	6.0	6.0	6.0	6.0
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	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	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
45										7.5	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	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
46										8.5	7.5	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	6.0	6.0	6.0	6.0	6.0	6.0	6.0
47										9.5	8.5	8.0	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	6.0	6.0	6.0	6.0	6.0	6.0
48										10.5	9.5	9.0	8.0	7.0	7.0	7.0	7.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
49										11.0	10.5	9.5	9.0	8.0	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	6.0	6.0	6.0	6.0	6.0	6.0	6.0
50										12.0	11.5	10.5	10.0	9.0	8.0	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.0	6.0	6.0	6.0	6.0	6.0	6.0
51										13.5	12.5	11.5	10.5	10.0	9.0	8.5	7.5	7.5	7.5	7.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.5	6.0	6.0	6.0	6.0	6.0
52										15.0	13.5	12.5	11.5	10.5	10.5	9.5	9.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	7.0	6.5	6.0	6.0	6.0	6.0	6.0
53										16.0	15.0	14.0	13.0	12.0	11.0	10.5	9.5	9.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.0	6.5	6.0	6.0	6.0
54										17.0	16.5	15.0	14.0	13.5	12.0	11.0	10.5	10.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.5	7.5	7.5	6.5	6.0	6.0
55				Not Analyzed						18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	10.5	9.5	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.0	6.0	6.0
56										20.0	19.0	17.5	17.0	15.5	14.5	14.0	12.5	11.5	11.0	10.5	9.5	9.0	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.0
57										21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	11.0	10.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.0	8.0	7.0
58										22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	11.5	10.5	10.5	9.5	9.0	9.0	8.5	8.5	8.5	8.5	8.5	8.5	8.0	7.5
59										23.5	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	12.5	12.0	11.0	10.5	9.5	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	8.5
60										25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0	13.0	12.0	11.0	11.0	10.0	9.5	9.5	9.5	9.0	9.0	9.0	9.0	9.0
61										26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.5	13.5	12.5	11.5	10.5	10.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
62										27.0	26.5	25.0	24.5	23.5	22.5	21.5	20.5	19.5	18.5	17.5	16.5	15.5	14.5	13.5	13.0	12.0	11.0	11.0	10.0	10.0	10.0	10.0	9.5	9.5
63																					16.5	16.0	15.5	14.5	14.0	13.0	12.0	11.5	10.5	10.5	10.5	10.5	10.5	10.5
64																					19.0	18.0	17.0	16.0	15.0	14.5	13.5	12.5	12.0	11.0	10.5	10.5	10.5	10.5
65																					20.0	19.0	18.0	17.0	16.5	15.5	15.0	14.0	13.0	12.5	11.5	11.0	11.0	11.0
66																					21.0	20.0	19.0	18.5	17.5	17.0	16.0	15.0	14.5	13.5	13.0	12.0	11.5	11.5
67																					22.5	21.5	20.5	19.5	19.0	18.0	17.5	16.5	15.5	15.0	14.0	13.0	12.5	12.0
68																					23.5	22.5	21.5	21.0	20.0	19.5	18.5	17.5	17.0	16.0	15.5	14.5	14.0	13.0
69																					24.0	23.5	23.0	22.0	21.5	20.5	20.0	19.0	18.0	17.5	16.5	16.0	15.5	14.5
70																					25.0	24.5	24.0	23.5	22.5	21.5	21.0	20.5	19.5	18.5	18.0	17.0	16.5	15.5

Note: Explanatory notes and limitations regarding the use of this table follow.

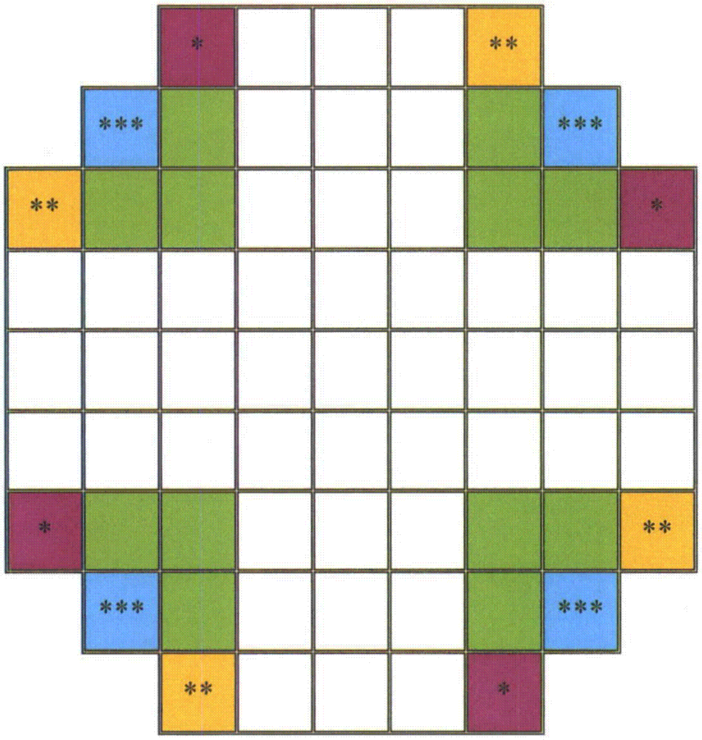
Notes, Table A.1.4.9-4:

- 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 a lattice average initial enrichment less than 0.9 (or less than the minimum provided above for each burnup) or greater than 5.0 wt.% U-235 is unacceptable for transportation.
- Fuel with a burnup greater than *62.5* GWd/MTU is unacceptable for transportation.
- Fuel with a burnup less than 10 GWd/MTU is acceptable for transportation after 6-years cooling.
- For reconstituted fuel assemblies with irradiated stainless steel rods, increase the cooling time by 1 for fuel assemblies in the 24 peripheral locations of the canister with cooling times less than 10 years. No adjustment of cooling time is required for fuel assemblies in other locations or for those that have cooled for more than 10 years.
- The cooling times for damaged and intact assemblies are identical. However, when loading five or more damaged fuel assemblies per DSC, an additional cooling time of 8 years is required for only damaged fuel assemblies.
- Example: An assembly with an initial enrichment of 4.85 wt. % U-235 and a burnup of 41.5 GWd/MTU is acceptable for transport after a 6-year cooling time as defined by 4.8 wt. % U-235 (rounding down) and 42 GWd/MTU (rounding up) on the qualification table (other considerations not withstanding).

Table A.1.4.9-5
BWR Assembly Decay Heat for Heat Load Configurations

The Decay Heat (DH) in watts is expressed as: $F1 = -59.1 + 23.4*X1 - 21.1*X2 + 0.280*X1^2 - 3.52*X1*X2 + 12.4*X2^2$ $DH = F1*Exp(\{[1-(1.2/X3)]* -0.720\}*[(X3-4.5)^{0.157}]*[(X2/X1)^{-0.132}]) + 10$ where, F1 Intermediate Function X1 Assembly Burnup in GWD/MTU X2 Initial Enrichment in wt. % U-235 X3 Cooling Time in Years (minimum 6 years)

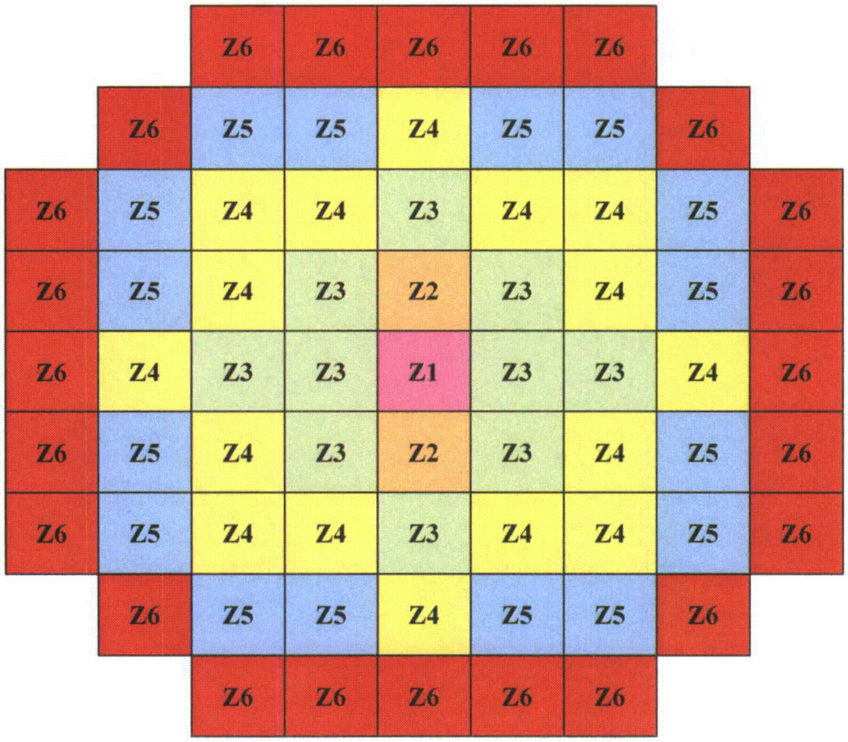
Note: Even though a minimum cooling time of 6 years is used, the minimum cooling time requirement with five or more damaged fuel assemblies from shielding requirements is per Table A.1.4.9-4.



*	Configuration 1(1)	**	Configuration 2(1)	***	Configuration 3(1)

1	Either one of these three sets of corner locations shall only be utilized to load up to four damaged assemblies with the remaining intact in a 69BTH Basket. The maximum lattice average initial enrichment of fuel assemblies (damaged or intact transported in either magenta set of cells for configuration 1, gold set of cells for configuration 2, or blue set of cells for configuration 3) is limited to the "up to 4 damaged assemblies" column of Table A.1.4.9-3.
	Following the placement of damaged fuel assemblies in either configuration 1 or 2, the remaining gold or magenta locations shall be used to load up to 4 additional damaged assemblies, with the remaining intact in a 69BTH Basket. The maximum lattice average initial enrichment for these fuel assemblies (damaged or intact transported in gold or magenta cells available) is limited to the "5 to 8 damaged assemblies" column of Table A.1.4.9-3.
	Following the placement of eight damaged fuel assemblies in the set of corner locations marked with a "*" (shaded in magenta) and a "**" (shaded in gold), the locations shaded in green or blue in Figure shall be used to load up to sixteen additional damaged assemblies, with the remaining intact in a 69BTH Basket. The maximum lattice average initial enrichment for all 24 fuel assemblies (damaged or intact transported in these 24 locations) is limited to the "9 to 24 Damaged Assemblies" column of Table A.1.4.9-3.

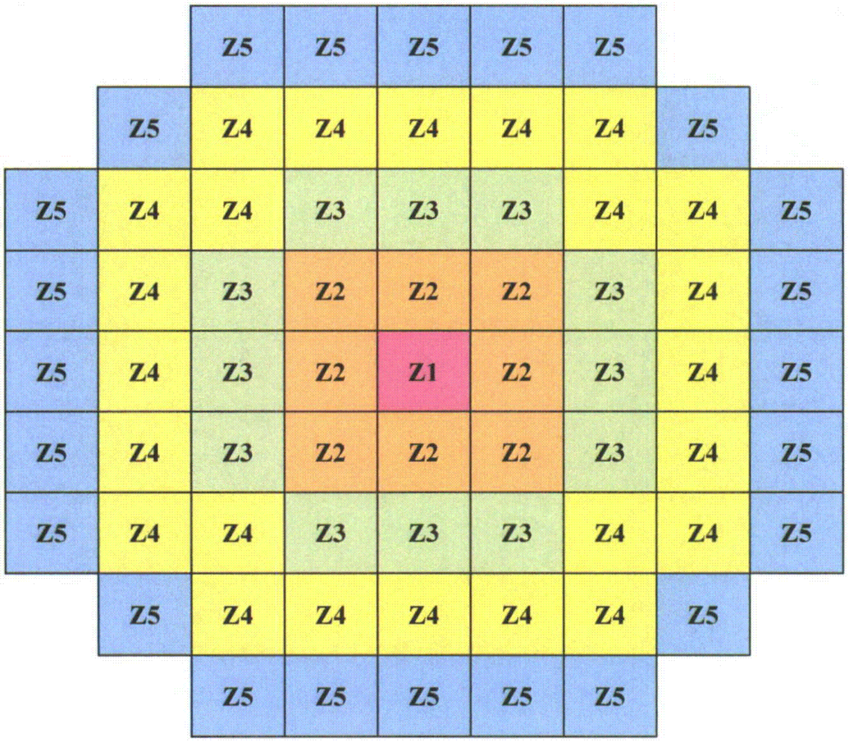
Figure A.1.4.9-1
Location of Damaged Fuel Assemblies Inside 69BTH DSC



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Max. Decay Heat (kW/FA) (3)(4)	0.10	0.27	0.30	0.40	0.55	0.45
No. of Fuel Assemblies (1)	1	2	10	16	16	24
Max. Decay Heat per Zone (kW) (3)	0.10	0.54	3.0	6.4	8.8	10.8
Max. Decay Heat per DSC (kW)	26.0 (2) (3)					

Notes: (1) Total number of fuel assemblies is 69 for HLZC # 1
(2) Adjust payload to maintain the total DSC heat load within the specified limit
(3) Reduce the maximum decay heat to 70% of the listed values for LaCrosse Fuel assembly. The total decay heat for LaCrosse fuel assembly is 18.2 kW per DSC for HLZC No. 1.
(4) Decay heat per fuel assembly shall be determined per Table A.1.4.9-5.

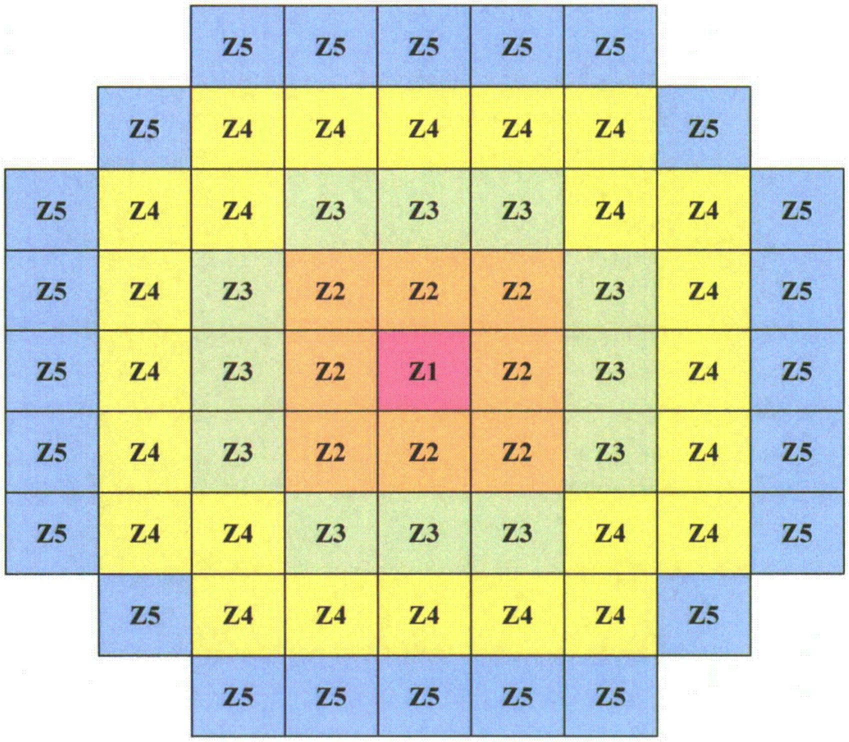
Figure A.1.4.9-2
Heat Load Zoning Configuration No. 1 for 69BTH Basket



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) (4)(5)	0.25	0.0 (1)	0.40	0.60	0.50
No. of Fuel Assemblies (2)	1	0	12	24	24
Max. Decay Heat per Zone (kW) (4)	0.25	0	4.8	14.4	12.0
Max. Decay Heat per DSC (kW)	26.0 (3) (4)				

Notes: (1) Aluminum dummy assemblies replace the fuel assemblies in zone 2
(2) Total number of fuel assemblies is 61 for HLZC # 2
(3) Adjust payload to maintain the total DSC heat load within the specified limit
(4) Reduce the maximum decay heat to 70% of the listed values for LaCrosse Fuel assembly. The total decay heat for LaCrosse fuel assembly is 18.2 kW per DSC for HLZC No. 2.
(5) Decay heat per fuel assembly shall be determined per Table A.1.4.9-5.

Figure A.1.4.9-3
Heat Load Zoning Configuration No. 2 for 69BTH Basket



	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) (4)(5)	0.25	0.0 (1)	0.40	0.60	0.50
No. of Fuel Assemblies (2)	1	0	12	24	24
Max. Decay Heat per Zone (kW) (4)	0.25	0	4.8	14.4	12.0
Max. Decay Heat per DSC (kW)	29.2 (3) (4)				

Notes: (1) Aluminum dummy assemblies replace the fuel assemblies in zone 2
(2) Total number of fuel assemblies is 61 for HLZC # 3
(3) Adjust payload to maintain the total DSC heat load within the specified limit
(4) Reduce the maximum decay heat to 70% of the listed values for LaCrosse Fuel assembly. The total decay heat for LaCrosse fuel assembly is 20.4 kW per DSC for HLZC No. 3.
(5) Decay heat per fuel assembly shall be determined per Table A.1.4.9-5.

Figure A.1.4.9-4
Heat Load Zoning Configuration No. 3 for 69BTH Basket

		Z5	Z5	Z5	Z5	Z5		
	Z5	Z4	Z4	Z4	Z4	Z4	Z5	
Z5	Z4	Z3	Z3	Z3	Z3	Z3	Z4	Z5
Z5	Z4	Z3	Z2	Z2	Z2	Z3	Z4	Z5
Z5	Z4	Z3	Z2	Z1	Z2	Z3	Z4	Z5
Z5	Z4	Z3	Z2	Z2	Z2	Z3	Z4	Z5
Z5	Z4	Z3	Z3	Z3	Z3	Z3	Z4	Z5
	Z5	Z4	Z4	Z4	Z4	Z4	Z5	
		Z5	Z5	Z5	Z5	Z5		

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
Max. Decay Heat (kW/FA) (4)(5)	0.0 (1)	0.45	0.0 (2)	0.70	0.60
No. of Fuel Assemblies (3)	0	8	0	20	24
Max. Decay Heat per Zone (kW) (4)	0	3.6	0	14.0	14.4
Max. Decay Heat per DSC (kW)	32.0 (4)				

Notes: (1) The fuel compartment in zone 1 remains empty
(2): Aluminum dummy assemblies replace the fuel assemblies in zone 3
(3): Total number of fuel assemblies is 52 for HLZC # 4
(4) Reduce the maximum decay heat to 70% of the listed values for LaCrosse Fuel assembly. The total decay heat for LaCrosse fuel assembly is 22.4 kW per DSC for HLZC No. 4.
(5) Decay heat per fuel assembly shall be determined per Table A.1.4.9-5.
(6) Borated Aluminum is the only poison material allowed for HLZC #4.

Figure A.1.4.9-5
Heat Load Zoning Configuration No. 4 for 69BTH Basket

Appendix A.1.4.9A
Radioactive Waste Canister

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Appendix A.1.4.9A Radioactive Waste Canister

NOTE: References in this appendix are shown as [1], [2], etc., and refer to the reference list in Section A.1.4.9A.4.

A.1.4.9A.1 Radioactive Waste Canister Description

The radioactive waste canister (RWC) is designed to contain dry irradiated and/or contaminated non-fuel-bearing solid materials (described further in paragraph A.1.4.9A.3), and is completely supported by the transport cask. Under normal transport conditions, the canister rests on four canister rails, attached to the inside surface of the aluminum inner sleeve of the NUHOMS®-MP197HB transport cask. The RWC is designed to transport its payload dry and in an air or inert gas environment. When a wet-load procedure (i.e., in-pool) is followed for cask loading, the RWC and transport cask cavities are drained and dried in order to ensure that free liquids do not remain in the package during transport. The heat generated by the contents of the RWC is transferred through the transport cask to the environment by conduction, convection and radiation. No forced cooling is required.

Each RWC system includes an outer cylindrical shell assembly. The shell assembly consists of a cylindrical shell, top shield plug, outer top cover plate, bottom shield plug, and outer bottom cover plate. As shown in Table A.1.4.9A-1, the RWC system consists of two design configurations:

- *Welded Top Shield Plug Design (RWC-W)*
- *Bolted Top Shield Plug Design (RWC-B)*

Table A.1.4.9A-1 provides the overall dimensions for each RWC configuration. The details of each configuration are included in the drawings contained in Section A.1.4.10.11 of Appendix A.1.4.10.

The RWC shell assemblies are stainless steel welded vessels that provide confinement of radioactive materials, encapsulate the contents in an air or inert atmosphere, and provide biological shielding. The RWC shell has redundant seal welds that join the shell and the top and bottom cover plate assemblies to seal the canister. The bottom end assembly welds are made during fabrication of the RWC shell. The top end closure welds are made after content loading. Both top plug penetrations (siphon and vent ports) are sealed after the RWC drying and backfilling operations are complete.

The RWC cylindrical shell, outer top cover plate and outer bottom cover plate are fabricated from ASTM A240 type 304 stainless steel. The bottom and top shield plugs are fabricated from ASTM A240 Type F304 or ASTM A182 Type 304 stainless steel. All RWC welding procedures, welders, and welding are performed in accordance with the requirements of AWS D1.1-98 [1] and AWS D1.6-99 [2]. All inspections are performed in accordance with AWS D1.1-98 [1] and AWS D1.6-99 [2].

Material properties used are listed in Chapter A.2, Table A.2-4. All structural components and payloads are the same or similar alloys of stainless steel and therefore, are not subject to chemical or galvanic interaction. Similarly, no hydrogen gas generation is expected.

A.1.4.9A.2 RWC Inner Liner

The inner liner assembly is a stainless steel welded cylinder with a bottom plate that is used with the RWC-W. The bottom plate is designed with drain holes to allow liquid from the inner liner to drain to the bottom of the RWC for dewatering.

All inner liner welding procedures, welders, and welding are performed in accordance with the requirements of AWS D1.6-99 [2]. All inspections are performed in accordance with AWS D1.6-99 [2]. The overall length and diameter of the liner are provided in Table A.1.4.9A-2. Details of the inner liner are shown in the drawings contained in Section A.1.4.10.11 of Appendix A.1.4.10.

Four lifting lugs are provided on the inner liner for lifting the inner liner either empty or loaded. The lugs are designed, fabricated and tested to the requirements of ANSI N14.6 [3]. The inner liner is manufactured with a keyway for alignment in the outer RWC-W canister.

A.1.4.9A.3 RWC Contents

The NUHOMS®-MP197HB packaging is designed to transport a payload of up to 56.0 tons of dry irradiated and/or contaminated non-fuel bearing solid materials in the RWC. The safety analysis of the cask takes no credit for the containment provided by the RWC.

The quantity of radioactive material is limited to a maximum of 8,182 A_2. The radioactive material is typically in the form of neutron activated metals, or metal oxides in solid form. Surface contamination may also be present on the irradiated components. When a wet-load procedure (i.e., in-pool) is followed for cask loading, the cask cavity and RWC are drained and dried to ensure that there are no free liquids in the package during transport.

The payload will vary from shipment to shipment. Typical composition of the payload consists of the following components either individually or in combinations:

1. *BWR Control Rod Blades*
2. *BWR Local Power Range Monitors (LPRMs)*
3. *BWR Fuel Channels*
4. *BWR Poison Curtains*
5. *PWR Burnable Poison Rod Assemblies (BPRAs)*
6. *PWR and BWR Reactor Vessel and Internals*

The typical cobalt-60 specific activity ranges for these items are as follows:

1. *Control Rod Blades*	$1.3 \times 10^{-4} - 1.1 \times 10^{-2}$ Ci/g
2. *LPRMs*	$1.0 \times 10^{-2} - 4.8 \times 10^{-2}$ Ci/g
3. *Fuel Channels*	$7.8 \times 10^{-5} - 2.0 \times 10^{-4}$ Ci/g
4. *Poison Curtains*	$6.2 \times 10^{-4} - 4.0 \times 10^{-2}$ Ci/g
5. *BPRAs*	$3.8 \times 10^{-4} - 1.3 \times 10^{-3}$ Ci/g

6. *Reactor Vessel and Internals* $2.0x10^{-5} - 1.3x10^{-2}$ *Ci/g*

Components with high specific activity are generally placed near the center of the RWC. For each shipment, the RWC is normally filled to capacity, which prevents shifting of the contents during transport. If the RWC is not full, appropriate component spacers or shoring is used to prevent significant movement of the contents.

The RWC assembly provides a minimum steel thickness of 1.75 inches in the radial direction. The RWC assembly provides a minimum steel thickness of 5.75 inches below the payload and a minimum steel thickness of 7.00 inches above the payload in the axial direction.

A.1.4.9A.4 References

1. *American Welding Society, D1.1-98, Structural Welding Code-Steel*
2. *American Welding Society, D1.6-99, Structural Welding Code-Stainless Steel*
3. *ANSI N14.6, Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More, 1993*

Table A.1.4.9A-1
Nominal Dimensions of the RWC

	RWC Design Parameters	
	RWC-W	***RWC-B***
Shell Thickness (in)	*1.25*	*1.75*
Canister Length (in.)	*186.50*	*186.50*
Outside Diameter (in.)	*67.19*	*67.19*
Cavity Length (in.)	*167.30*	*167.30*
Cavity Diameter (in.)	*64.69*	*63.69*

Table A.1.4.9A-2
Nominal Dimensions of the RWC Inner Liner

	RWC-W Inner Liner Design Parameters
Shell Thickness (in.)	*0.50*
Outside Length (in.)	*166.30*
Outside Diameter (in.)	*63.69*
Cavity Length (in.)	*162.11*
Cavity Diameter (in.)	*62.69*

Appendix A.1.4.10
Drawings of Transport Packaging and DSCs

TABLE OF CONTENTS

Appendix A.1.4.10
NUHOMS®-MP197HB SAR Drawings

The following drawings for the NUHOMS®-MP197HB Cask are included in Section A.1.4.10.1.

Drawing Number	Title
MP197HB-71-1001 Rev 1	NUHOMS®-MP197HB Packaging Transport Configuration (2 sheets)
MP197HB-71-1002 Rev 2	NUHOMS®-MP197HB Packaging Parts List (2 sheets)
MP197HB-71-1003 Rev 1	NUHOMS®-MP197HB Packaging General Arrangement (1 sheet)
MP197HB-71-1004 Rev 2	NUHOMS®-MP197HB Packaging Cask Body Assembly (1 sheet)
MP197HB-71-1005 Rev 1	NUHOMS®-MP197HB Packaging Cask Body Details (3 sheets)
MP197HB-71-1006 Rev 0	NUHOMS®-MP197HB Packaging Lid Assembly & Details (1 sheet)
MP197HB-71-1007 Rev 0	NUHOMS®-MP197HB Packaging Regulatory Plate (1 sheet)
MP197HB-71-1008 Rev 1	NUHOMS®-MP197HB Packaging Impact Limiter Assembly (1 sheet)
MP197HB-71-1009 Rev 1	NUHOMS®-MP197HB Packaging Impact Limiter Details (1 sheet)
MP197HB-71-1011 Rev 0	NUHOMS®-MP197HB Packaging Transport Configuration Outer Sleeve With Fins Option (1 sheet)
MP197HB-71-1014 Rev 0	NUHOMS®-MP197HB Packaging Internal Sleeve Design (2 sheets)

The following drawings for the NUHOMS® 24PT4 DSC are included in Section A.1.4.10.2.

Drawing Number	Title
NUH24PT4-71-1001 Rev 0	NUHOMS® 24PT4 Transportable Canister For PWR Fuel Basket Assembly (5 sheets)
NUH24PT4-71-1002 Rev 0	NUHOMS® 24PT4 Transportable Canister For PWR Fuel Main Assembly (8 sheets)
NUH24PT4-71-1003 Rev 0	NUHOMS® 24PT4 Transportable Canister For PWR Fuel Failed Fuel Can (4 sheets)

The following drawings for the NUHOMS® 32PT DSC are included in Section A.1.4.10.3.

Drawing Number	Title
NUH32PT-71-1000 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel Summary Dimensions (1 sheet)
NUH32PT-71-1001 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel Main Assembly (5 sheets)
NUH32PT-71-1002 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Shell Assembly (3 sheets)
NUH32PT-71-1003 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel "A" Basket Assembly (16 Poison/16 Compartment Plates) (8 sheets)
NUH32PT-71-1004 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel Aluminum Transition Rail – R90 (2 sheets)
NUH32PT-71-1005 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel Aluminum Transition Rail – R45 (1 sheet)
NUH32PT-71-1006 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel "A/B/C/D" Basket Assembly (20 Poison/12 Compartment Plates) (6 sheets)
NUH32PT-71-1007 Rev 0	NUHOMS® 32PT Transportable Canister For PWR Fuel "A/B/C/D" Basket Assembly (24 Poison/8 Compartment Plates) (8 sheets)

The following drawings for the NUHOMS® 24PTH DSC are included in Section A.1.4.10.4.

Drawing Number	Title
NUH24PTH-71-1000 Rev 0	NUHOMS® 24PTH Transportable Canister For PWR Fuel Main Assembly (5 sheets)
NUH24PTH-71-1001 Rev 0	NUHOMS® 24PTH Transportable Canister For PWR Fuel Basket-Shell Assembly (4 sheets)
NUH24PTH-71-1002 Rev 0	NUHOMS® 24PTH Transportable Canister For PWR Shell Assembly (4 sheets)
NUH24PTH-71-1003 Rev *1*	NUHOMS® 24PTH Transportable Canister For PWR Fuel Basket Assembly (*8* sheets)
NUH24PTH-71-1004 Rev 0	NUHOMS® 24PTH Transportable Canister For PWR Fuel Transition Rails (4 sheets)
NUH24PTH-71-1008 Rev 0	NUHOMS® 24PTHF Transportable Canister For PWR Fuel Failed Fuel Can (2 sheets)
NUH24PTH-71-1009 Rev 0	NUHOMS® 24PTHF Transportable Canister For PWR Fuel Basket Assembly (8 sheets)

The following drawings for the NUHOMS® 32PTH DSC and the 32PTH Type 1 DSC are included in Section A.1.4.10.5.

Drawing Number	Title
NUH32PTH-71-1001 Rev *1*	NUHOMS®32PTH Transportable Canister for PWR Fuel Parts List (1 Sheet)
NUH32PTH-71-1002 Rev *1*	NUHOMS®32PTH Transportable Canister for PWR Fuel Main Assembly (1 Sheet)
NUH32PTH-71-1003 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Siphon Pipe Details (1 Sheet)
NUH32PTH-71-1004 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Inner Top Cover Details (2 sheets)
NUH32PTH-71-1005 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Outer Top Cover Details (1 Sheet)
NUH32PTH-71-1006 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Shell Assembly (1 Sheet)
NUH32PTH-71-1007 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Shell Bottom Details (1 Sheet)
NUH32PTH-71-1008 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Grapple Ring Details (1 Sheet)
NUH32PTH-71-1009 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Basket Assembly (1 Sheet)
NUH32PTH-71-1010 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Basket Assembly Details (1 Sheet)
NUH32PTH-71-1011 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Basket Assembly Details (1 Sheet)
NUH32PTH-71-1012 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Basket Assembly – Details (1 Sheet)
NUH32PTH-71-1013 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Basket Rail A180 (1 Sheet)
NUH32PTH-71-1014 Rev 0	NUHOMS®32PTH Transportable Canister for PWR Fuel Basket Rail A90 (1 Sheet)
NUH32PTH-71-1015 Rev 0	*NUHOMS®32PTH Transportable Canister for PWR Fuel Damaged Fuel End Caps (1 Sheet)*
NUH32PTH Type 1-71-1000 Rev 0	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Main Assembly (4 sheets)
NUH32PTH Type 1-71-1001 Rev *1*	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Basket Shell Assembly (*4* sheets)
NUH32PTH Type 1-71-1002 Rev 0	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Shell Assembly (4 sheets)

Drawing Number	Title
NUH32PTH Type 1-71-1003 Rev *1*	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Basket Assembly (7 sheets)
NUH32PTH Type 1-71-1004 Rev *1*	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Transition Rails (*4* sheets)
NUH32PTH Type 1-71-1010 Rev 0	NUHOMS® 32PTH Type 1 Transportable Canister For PWR Fuel Alternate Top Closure (6 sheets)

The following drawings for the NUHOMS® 32PTH1 DSC are included in Section A.1.4.10.6.

Drawing Number	Title
NUH32PTH1-71-1000 Rev 0	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Main Assembly (4 sheets)
NUH32PTH1-71-1001 Rev 0	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Basket Shell Assembly (5 sheets)
NUH32PTH1-71-1002 Rev 0	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Shell Assembly (4 sheets)
NUH32PTH1-71-1003 Rev *1*	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Basket Assembly (*8* sheets)
NUH32PTH1-71-1004 Rev 0	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Transition Rails (7 sheets)
NUH32PTH1-71-1010 Rev 0	NUHOMS® 32PTH1 Transportable Canister For PWR Fuel Alternate Top Closure (6 sheets)

The following drawings for the NUHOMS® 37PTH DSC are included in Section A.1.4.10.7.

Drawing Number	Title
NUH37PTH-71-1001 Rev *1*	NUHOMS® 37PTH Transportable Canister For PWR Fuel Main Assembly (4 sheets)
NUH37PTH-71-1002 Rev *1*	NUHOMS® 37PTH Transportable Canister For PWR Fuel Basket Shell Assembly (5 sheets)
NUH37PTH-71-1003 Rev *1*	NUHOMS® 37PTH Transportable Canister For PWR Fuel Shell Assembly (4 sheets)
NUH37PTH-71-1004 Rev *1*	NUHOMS® 37PTH Transportable Canister For PWR Fuel Alternate 2 Top Closure (6 sheets)
NUH37PTH-71-1011 Rev *1*	NUHOMS® 37PTH Transportable Canister For PWR Fuel Basket Assembly (7 sheets)
NUH37PTH-71-1012 Rev *1*	NUHOMS® 37PTH Transportable Canister For PWR Fuel Transition Rails (7 sheets)
NUH37PTH-71-1015 Rev 0	*NUHOMS® 37PTH Transportable Canister For PWR Fuel Damaged Fuel End Caps (1 sheet)*

The following drawings for the NUHOMS® 61BT DSC are included in Section A.1.4.10.8.

Drawing Number	Title
NUH61BT-71-1000 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Parts List (1 sheet)
NUH61BT-71-1001 Rev 1	NUHOMS® 61BT Transportable Canister For BWR Fuel Basket Assembly (1 sheet)
NUH61BT-71-1002 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Basket Details (1 sheet)
NUH61BT-71-1003 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel General Assembly (1 sheet)
NUH61BT-71-1004 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel General Assembly (1 sheet)
NUH61BT-71-1005 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Shell Assembly (1 sheet)
NUH61BT-71-1006 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Shell Assembly (1 sheet)
NUH61BT-71-1007 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Canister Details (1 sheet)
NUH61BT-71-1008 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Canister Details (1 sheet)
NUH61BT-71-1009 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Basket Details (1 sheet)
NUH61BT-71-1010 Rev 0	NUHOMS® 61BT Transportable Canister For BWR Fuel Additional Basket Details – Damaged Fuel (4 sheets)

The following drawings for the NUHOMS® 61BTH DSC are included in Section A.1.4.10.9.

Drawing Number	Title
NUH61BTH-71-1000 Rev 0	NUHOMS® 61BTH Type 1 Transportable Canister For BWR Fuel Main Assembly (5 sheets)
NUH61BTH-71-1100 Rev 1	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Main Assembly (7 sheets)
NUH61BTH-71-1101 Rev 0	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Shell Assembly (2 sheets)
NUH61BTH-71-1102 Rev 1	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Basket Assembly (8 sheets)
NUH61BTH-71-1103 Rev 0	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Transition Rails (2 sheets)
NUH61BTH-71-1104 Rev 0	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Damaged Fuel End Caps (1 sheet)
NUH61BTH-71-1105 Rev 0	NUHOMS® 61BTHF Type 2 Transportable Canister For BWR Fuel Failed Fuel Can (2 sheets)
NUH61BTH-71-1106 Rev 1	NUHOMS® 61BTH Type 2 Transportable Canister For BWR Fuel Top Grid Assembly Alternate 3 (2 sheets)

The following drawings for the NUHOMS® 69BTH DSC are included in Section A.1.4.10.10.

Drawing Number	Title
NUH69BTH-71-1001 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Main Assembly (4 sheets)
NUH69BTH-71-1002 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Basket – Shell Assembly (4 sheets)
NUH69BTH-71-1003 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Shell Assembly (4 sheets)
NUH69BTH-71-1004 Rev 2	NUHOMS® 69BTH Transportable Canister For BWR Fuel Alternate Top Closure (6 sheets)
NUH69BTH-71-1011 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Basket Assembly (5 sheets)
NUH69BTH-71-1012 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Transition Rail Assembly And Details (6 sheets)
NUH69BTH-71-1013 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Holddown Ring Assembly (2 sheets)
NUH69BTH-71-1014 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Damaged Fuel Modification (1 sheet)
NUH69BTH-71-1015 Rev 1	NUHOMS® 69BTH Transportable Canister For BWR Fuel Damaged Fuel End Caps (1 sheet)

The following drawings for the Radioactive Waste Canister are included in Section A.1.4.10.11.

Drawing Number	Title
NUHRWC-71-1001 Rev 0	NUHOMS® System RWC Canister - Welded Top Shield Plug Design Main Assembly (5 sheets)
NUHRWC-71-1002 Rev 0	NUHOMS® System RWC Canister - Welded Top Shield Plug Design Inner Liner (3 sheets)
NUHRWC-71-1003 Rev 0	NUHOMS® System RWC Canister - Bolted Top Shield Plug Design Main Assembly (4 sheets)

A.1.4.10.1 NUHOMS®-MP197HB DRAWINGS

This section contains drawings for the NUHOMS®-MP197HB.

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TRANSPORT CONFIGURATION

DRAWING NO. MP197HB-71-1001 | SCALE NONE | SHEET 1 OF 2

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DRAWING NO	SHEET	REVISION
MP197HB-71-1001	2 OF 2	1

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DRAWING NO	SHEET	REVISION
MP197HB-71-1002	2 OF 2	3

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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SAFETY ANALYSIS REPORT
NUHOMS®MP197HB PACKAGING
CASK BODY ASSEMBLY

DRAWING NO.	SCALE	SHEET
MP197HB-71-1004	NONE	1 OF 1

DRAWING NO. MP197HB-71-1004 SHEET 1 OF 1

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CASK BODY DETAILS

DRAWING NO. MP197HB-71-1005 | SCALE NONE | SHEET 1 OF 3

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DRAWING NO.	SHEET	REVISION
MP197HB-71-1005	2 OF 3	2

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MP197HB-71-1006 1 OF 1

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DRAWING NO.	SCALE	SHEET
MP197HB-71-1006	NONE	1 OF 1

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IMPACT LIMITER ASSEMBLY

DRAWING NO.	SCALE	SHEET
MP197HB-71-1008	NONE	1 OF 1

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DRAWING NO.	SCALE	SHEET
MP197HB-71-1009	NONE	1 OF 1

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DETAIL 3

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STRUCTURAL	Raheel Haroon	
CHECKED	Olivier Gandou	
DRAWN	JOANNA. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

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NUHOMS® MP197HB PACKAGING
TRANSPORT CONFIGURATION
OUTER SLEEVE WITH FINS OPTION

DRAWING NO	SCALE	SHEET
MP197HB-71-1011	NONE	1 OF 1

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

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MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

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NUHOMS® MP197HB PACKAGING
INTERNAL SLEEVE DESIGN

DRAWING NO: MP197HB-71-1014 | SCALE: NONE | SHEET: 1 OF 2

8 7 6 5 4 3 2 1

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DRAWING NO.	SHEET	REVISION
MP197HB-71-1014	2 OF 2	1

A.1.4.10.2 NUHOMS® 24PT4 DSC DRAWINGS

This section contains drawings for the NUHOMS® 24PT4 DSC.

DRAWING NO. NUH24PT4-71-1001 SHEET 1 OF 5

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	NAME / INITIALS	DATE
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CHECKED	Olivier Gandou	
DRAWN	J. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M–1994.

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PT4
TRANSPORTABLE CANISTER FOR PWR FUEL BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH24PT4-71-1001	NONE	1 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

NUH24PT4-71-1001 4 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH24PT4-71-1001	4 OF 5	0

NUH24PT4-71-1001 5 OF 5

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	Olivier Gandou	
DRAWN	JOANNA. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PT4
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO NUH24PT4-71-1002 | SCALE NONE | SHEET 1 OF 8

**PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390**

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH24PT4-71-1002 7 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

**PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390**

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PT4
TRANSPORTABLE CANISTER FOR PWR FUEL FAILED FUEL CAN

DRAWING NO.	SCALE	SHEET
NUH24PT4-71-1003	NONE	1 OF 4

SECURITY RELATED INFORMATION

NUH24PT4-71-1003 2 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH24PT4-71-1003 2 OF 4 0

SECURITY RELATED INFORMATION

NUH24PT4-71-1003 3 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH24PT4-71-1003	3 OF 4	0

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

A.1.4.10.3 NUHOMS® 32PT DSC DRAWINGS

This section contains drawings for the NUHOMS® 32PT DSC.

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
SUMMARY DIMENSIONS

DRAWING NO.	SCALE	SHEET
NUH32PT-71-1000	NONE	1 OF 1

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/14/11
0	FIRST ISSUE	03-26-09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PT-71-1001	NONE	1 OF 5

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PT-71-1001	4 OF 5	1

8 7 6 5 4 3 2 1

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PT-71-1001	5 OF 5	1

NUH32PT-71-1001 5 OF 5

PARTS LIST

ITEM No.	No. REQ'D	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION OR PART NUMBER	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/14/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL ASSEMBLY

DRAWING NO. NUH32PT-71-1002 | SCALE NONE | SHEET 1 OF 3

8 7 6 5 4 3 2 1

NUH32PT-71-1002 | 2 OF 3

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PT-71-1002	3 OF 3	1

NUH32PT-71-1002 3 OF 3

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/14/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
"A" BASKET ASSEMBLY (16 POISON/16 COMPARTMENT PLATES)

DRAWING NO. NUH32PT-71-1003 | SCALE NONE | SHEET 1 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

NUH32PT-71-1003 4 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

SECURITY RELATED INFORMATION

PARTS LIST					
ITEM No.	No. REQ'D	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION OR PART NUMBER	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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0	FIRST ISSUE	03/26/09

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P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
ALUMINUM TRANSITION RAIL – R90

DRAWING NO. NUH32PT-71-1004 | SCALE NONE | SHEET 1 OF 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PT-71-1004	2 OF 2	1

PARTS LIST					
ITEM No	No REQ'D	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION OR PART NUMBER	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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0	FIRST ISSUE	03/26/09

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MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
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SAFETY ANALYSIS REPORT
NUHOMS® 32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
ALUMINUM TRANSITION RAIL - R45

DRAWING NO.	SCALE	SHEET	REVISION
NUH32PT-71-1005	NONE	1 OF 1	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/14/11
0	FIRST ISSUE	03/26/09

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MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
"A/B/C/D" BASKET ASSEMBLY (20 POISON/12 COMPARTMENT PLATES)

DRAWING NO.	SCALE	SHEET
NUH32PT-71-1006	NONE	1 OF 6

8 7 6 5 4 3 2 1

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PT-71-1006	2 OF 6	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PT-71-1006	6 OF 6	1

NUH32PT-71-1006 6 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/14/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
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DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS®32PT
TRANSPORTABLE CANISTER FOR PWR FUEL
"A/B/C/D" BASKET ASSEMBLY (24 POISON/8 COMPARTMENT PLATES)

DRAWING NO. NUH32PT-71-1007 | SCALE NONE | SHEET 1 OF 8

NUH32PT-71-1007 2 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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NUH32PT-71-1007 6 OF 8

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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8 7 6 5 4 3 2 1

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

A.1.4.10.4 NUHOMS® 24PTH DSC DRAWINGS

This section contains drawings for the NUHOMS® 24PTH DSC.

SECURITY RELATED INFORMATION

NUH24PTH-71-1000 1 OF 5

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PARTS LIST

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/25/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO. NUH24PTH-71-1000 SCALE NONE SHEET 1 OF 5

8 7 6 5 4 3 2 1

NUH24PTH-71-1000 2 OF 5

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

H G F E D C B A

NUH24PTH-71-1000 2 OF 5 1

8 7 6 5 4 3 2 1

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH24PTH-71-1000 5 OF 5

8 7 6 5 4 3 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/25/09

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P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET SHELL ASSEMBLY

DRAWING NO. NUH24PTH-71-1001 | SCALE NONE | SHEET 1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

NUH24PTH-71-1001 4 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH24PTH-71-1001 4 OF 4 1

8 7 6 5 4 3 2 1

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
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INTERPPET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL ASSEMBLY

DRAWING NO NUH24PTH-71-1002 | SCALE NONE | SHEET 1 OF 4

8 7 6 5 4 3 2 1

NUH24PTH-71-1002 2 OF 4

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

NUH24PTH-71-1002 2 OF 4 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
1	REVISED FOR FABRICABILITY ENHANCEMENTS	03/10/10
0	FIRST ISSUE	03/25/09

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH24PTH-71-1003	NONE	1 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH24PTH-71-1003 2 OF 8 2

NUH24PTH-71-1003 3 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH24PTH-71-1003	3 OF 8	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH24PTH-71-1003 | 8 OF 8 | 2

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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0	FIRST ISSUE	03/10/10

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
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STRUCTURAL		
CHECKED		
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SAFETY ANALYSIS REPORT
NUHOMS® 24PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
TRANSITION RAILS

DRAWING NO	SCALE	SHEET
NUH24PTH-71-1004	NONE	1 OF 4

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH24PTH-71-1004	2 OF 4	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH24PTH-71-1004	3 OF 4	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH24PTH-038	01/28/11
0	FIRST ISSUE	03/25/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PTHF
TRANSPORTABLE CANISTER FOR PWR FUEL
FAILED FUEL CAN

DRAWING NO	SCALE	SHEET
NUH24PTH-71-1008	NONE	1 OF 2

NUH24PTH-71-1008 2 OF 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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1	REVISED PER DCR NUH24PTH-038	01/28/11
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	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 24PTHF
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY

DRAWING NO	SCALE	SHEET
NUH24PTH-71-1009	NONE	1 OF 8

8 7 6 5 4 3 2 1

NUH24PTH-71-1009 2 OF 8

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

A.1.4.10.5 NUHOMS® 32PTH DSC DRAWINGS

This section contains drawings for the NUHOMS® 32PTH DSC.

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
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ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
PARTS LIST

DRAWING NO.	SCALE	SHEET
NUH32PTH-71-1001	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER NRC RAI #1 2-33	04/07/10
0	FIRST ISSUE	03/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
Transnuclear, Inc.

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PTH-71-1002	NONE	1 OF 1

NUH32PTH-71-1002 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
SIPHON PIPE DETAILS

DRAWING NO. NUH32PTH-71-1003 | SCALE NONE | SHEET 1 OF 1

NUH32PTH-71-1003 1 OF 1

SECURITY RELATED INFORMATION

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
INNER TOP COVER DETAILS

DRAWING NO. NUH32PTH-71-1004 | SCALE NONE | SHEET 1 OF 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

Revision	Description	Date
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
OUTER TOP COVER DETAILS

DRAWING NO. NUH32PTH-71-1005 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS
P.E.	Steve Streutker
NUCLEAR	Prakash Narayanan
MECHANICAL THERMAL	Prakash Narayanan
STRUCTURAL	Raheel Haroon
CHECKED	Olivier Gandou
DRAWN	JOANNA. TIAN

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL ASSEMBLY

DRAWING NO. NUH32PTH-71-1006 SCALE NONE SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL BOTTOM DETAILS

DRAWING NO. NUH32PTH-71-1007 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	Olivier Gandou	
DRAWN	JOANNA. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
GRAPPLE RING DETAILS

DRAWING NO.	SCALE	SHEET
NUH32PTH-71-1008	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL BASKET ASSEMBLY

DRAWING NO	SCALE	SHEET
NUH32PTH-71-1009	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY DETAILS

DRAWING NO. NUH32PTH-71-1010 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY DETAILS

DRAWING NO.	SCALE	SHEET
NUH32PTH-71-1011	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

0	FIRST ISSUE	3/26/09
REVISION	DESCRIPTION	DATE

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS 32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY-DETAILS

DRAWING NO.	SCALE	SHEET
NUH32PTH-71-1012	NONE	1 OF 1

NUH32PTH-71-1013 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET RAIL A180

DRAWING NO. NUH32PTH-71-1013 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 32PTH
TRANSPORTABLE CONTAINER FOR PWR FUEL
BASKET RAIL A90

DRAWING NO. NUH32PTH-71-1014 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	INITIAL ISSUE PER NRC RAI #1 2-3	04/08/10

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269

Transnuclear, Inc.

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
DAMAGED FUEL END CAPS

DRAWING NO.	SCALE	SHEET
NUH32PTH-71-1015	NONE	1 OF 1

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH TYPE 1
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO	SCALE	SHEET
NUH32PTH TYPE 1-71-1000	NONE	1 OF 4

8 7 6 5 4 3 2 1

NUH32PTH TYPE 1-71-1000 2 OF 4

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH TYPE 1-71-1000	2 OF 4	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
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0	FIRST ISSUE	03/26/09

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH TYPE 1
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PTH TYPE 1-71-1001	NONE	1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH TYPE 1-71-1001	2 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH TYPE 1-71-1001	4 OF 4	2

SECURITY RELATED INFORMATION

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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1	REVISED PER DCR NUH09-017	03/15/11
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	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS*32PTH TYPE 1
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL ASSEMBLY

DRAWING NO. NUH32PTH TYPE 1-71-1002 | SCALE NONE | SHEET 1 OF 4

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

NUH32PTH TYPE 1-71-1002 3 OF 4

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH TYPE 1-71-1002	3 OF 4	1

8 7 6 5 4 3 2 1

SECURITY RELATED INFORMATION

NUH32PTH TYPE 1-71-1002 | 4 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH TYPE 1-71-1002	4 OF 4	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
1	REVISED PER RAI #1 2-3	04/07/10
0	FIRST ISSUE	03/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH TYPE 1
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PTH TYPE 1-71-1003	NONE	1 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH TYPE 1-71-1003	3 OF 7	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH TYPE 1-71-1003	4 OF 7	2

NUH32PTH TYPE 1-71-1003 4 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH TYPE 1-71-1003	7 OF 7	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 32PTH TYPE 1
TRANSPORTABLE CANISTER FOR PWR FUEL
TRANSITION RAILS

DRAWING NO.	SCALE	SHEET
NUH32PTH TYPE 1-71-1004	NONE	1 OF 4

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH TYPE 1-71-1004	3 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH32PTH TYPE 1-71-1004 | 4 OF 4 | 2

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 32PTH TYPE 1
TRANSPORTABLE CANISTER FOR PWR FUEL
ALTERNATE TOP CLOSURE

DRAWING NO	SCALE	SHEET
NUH32PTH TYPE 1-71-1010	NONE	1 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH TYPE 1-71-1010	4 OF 6	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH32PTH TYPE 1-71-1010 6 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

A.1.4.10.6 NUHOMS® 32PTH1 DSC DRAWINGS

This section contains drawings for the NUHOMS® 32PTH1 DSC.

NUH32PTH1-71-1000 1 OF 4

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH1
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO	SCALE	SHEET
NUH32PTH1-71-1000	NONE	1 OF 4

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH1-71-1000	3 OF 4	1

8 7 6 5 4 3 2 1

NUH32PTH1-71-1000 4 OF 4

H G F E D C B A

**PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390**

DRAWING NO.	SHEET	REVISION
NUH32PTH1-71-1000	4 OF 4	1

8 7 6 5 4 3 2 1

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH1
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PTH1-71-1001	NONE	1 OF 5

8 7 6 5 4 3 2 1

NUH32PTH1-71-1001 2 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH1-71-1001	2 OF 5	1

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

NUH32PTH1-71-1001 3 OF 5

H G F E D C B A

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

H G F E D C B A

DRAWING NO.	SHEET	REVISION
NUH32PTH1-71-1001	3 OF 5	1

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

NUH32PTH1-71-1001 5 OF 5

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

SECURITY RELATED INFORMATION

NUH32PTH1-71-1002 1 OF 4

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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SAFETY ANALYSIS REPORT
NUHOMS®32PTH1
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PTH1-71-1002	NONE	1 OF 4

SECURITY RELATED INFORMATION

NUH32PTH1-71-1002 2 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO. NUH32PTH1-71-1002 SHEET 2 OF 4 REVISION 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH1-71-1002	4 OF 4	1

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH1
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH32PTH1-71-1003	NONE	1 OF 8

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH32PTH1-71-1003 | 2 OF 8 | 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH1-71-1003	4 OF 8	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH32PTH1-71-1003 | 5 OF 8 | 2

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH1-71-1003	6 OF 8	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH32PTH1-71-1003	7 OF 8	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

SECURITY RELATED INFORMATION

NUH32PTH1-71-1004 1 OF 7

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PARTS LIST

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
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SAFETY ANALYSIS REPORT
NUHOMS® 32PTH1
TRANSPORTABLE CANISTER FOR PWR FUEL
TRANSITION RAILS

DRAWING NO. NUH32PTH1-71-1004 | SCALE NONE | SHEET 1 OF 7

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH1-71-1004	2 OF 7	1

NUH32PTH1-71-1004 2 OF 7

8 7 6 5 4 3 2 1

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH32PTH1-71-1004	3 OF 7	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

SECURITY RELATED INFORMATION

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH32PTH1-71-1004 | 6 OF 7 | 1

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

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NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

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AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®32PTH1
TRANSPORTABLE CANISTER FOR PWR FUEL
ALTERNATE TOP CLOSURE

DRAWING NO. NUH32PTH1-71-1010 | SCALE NONE | SHEET 1 OF 6

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

NUH32PTH1-71-1010 3 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

SECURITY RELATED INFORMATION

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

**PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390**

A.1.4.10.7 NUHOMS® 37PTH DSC DRAWINGS

This section contains drawings for the NUHOMS® 37PTH DSC.

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
MAIN ASSEMBLY

DRAWING NO. NUH37PTH-71-1001 | SCALE NONE | SHEET 1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1001	3 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1001	4 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH37PTH-71-1002	NONE	1 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1002	2 OF 5	2

DRAWING NO NUH37PTH-71-1002 SHEET 2 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH37PTH-71-1002	4 OF 5	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1002	5 OF 5	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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SAFETY ANALYSIS REPORT
NUHOMS®37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH37PTH-71-1003	NONE	1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1003	2 OF 4	2

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1003	3 OF 4	2

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
ALTERNATE TOP CLOSURE

DRAWING NO. NUH37PTH-71-1004 | SCALE NONE | SHEET 1 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1004	3 OF 6	2

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1004	4 OF 6	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO NUH37PTH-71-1004 SHEET 6 OF 6 REVISION 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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SAFETY ANALYSIS REPORT
NUHOMS®37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
BASKET ASSEMBLY

DRAWING NO. NUH37PTH-71-1011 | SCALE NONE | SHEET 1 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1011	5 OF 7	2

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1011	6 OF 7	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1011	7 OF 7	2

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269 TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
TRANSITION RAILS

DRAWING NO.	SCALE	SHEET
NUH37PTH-71-1012	NONE	1 OF 7

NUH37PTH-71-1012 2 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH37PTH-71-1012	2 OF 7	1

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1012	3 OF 7	1

NUH37PTH-71-1012 4 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1012	4 OF 7	1

NUH37PTH-71-1012 5 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1012	5 OF 7	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH37PTH-71-1012	7 OF 7	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE PER NRC RAI #1 2-3	04/07/10

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269 TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS®37PTH
TRANSPORTABLE CANISTER FOR PWR FUEL
DAMAGED FUEL END CAPS

DRAWING NO NUH37PTH-71-1015 | SCALE NONE | SHEET 1 OF 1

DRAWING NO NUH37PTH-71-1015 SHEET 1 OF 1

A.1.4.10.8 NUHOMS® 61BT DSC DRAWINGS

This section contains drawings for the NUHOMS® 61BT DSC.

PARTS LIST

ITEM	QTY	DESCRIPTION	NOMENCLATURE	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
PARTS LIST

DRAWING NO.	SCALE	SHEET
NUH61BT-71-1000	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REMOVE NON REQUIRED PT	3/23/10
0	FIRST ISSUE	3/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH61BT-71-1001	NONE	1 OF 1

SECURITY RELATED INFORMATION

NUH61BT-71-1002 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL BASKET DETAILS

DRAWING NO	SCALE	SHEET
NUH61BT-71-1002	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
GENERAL ASSEMBLY

DRAWING NO. NUH61BT-71-1003 | SCALE NONE | SHEET 1 OF 1

NUH61BT-71-1004 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	Olivier Gandou	
DRAWN	JOANNA. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
Proprietary Property of Transnuclear, Inc.

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
GENERAL ASSEMBLY

DRAWING NO. NUH61BT-71-1004 | SCALE NONE | SHEET 1 OF 1

SECURITY RELATED INFORMATION

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	Olivier Gandou	
DRAWN	JOANNA. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269 Proprietary Property of Transnuclear, Inc.

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
SHELL ASSEMBLY

DRAWING NO. NUH61BT-71-1005 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. Patent No. 4,780,269
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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
SHELL ASSEMBLY

DRAWING NO NUH61BT-71-1006 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
CANISTER DETAILS

DRAWING NO. NUH61BT-71-1007 | SCALE NONE | SHEET 1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

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DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ASME Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
CANISTER DETAILS

DRAWING NO.	SCALE	SHEET
NUH61BT-71-1008	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
0	FIRST ISSUE	3/26/09

	NAME / INITIALS	DATE
P.E.	Steve Streutker	Digitally signed by Steve Streutker Date: 2009.03.26 16:53:32 -04'00'
NUCLEAR	Prakash Narayanan	
MECHANICAL THERMAL	Prakash Narayanan	
STRUCTURAL	Raheel Haroon	
CHECKED	ERNESTO VILLAFLORES	
DRAWN	J. TIAN	

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL BASKET DETAILS

DRAWING NO	SCALE	SHEET
NUH61BT-71-1009	NONE	1 OF 1

SECURITY RELATED INFORMATION

NUH61BT-71-1010 1 OF 4

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BT
TRANSPORTABLE CANISTER FOR BWR FUEL
ADDITIONAL BASKET DETAILS - DAMAGED FUEL

DRAWING NO. NUH61BT-71-1010 SCALE NONE SHEET 1 OF 4

NUH61BT-71-1010 2 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH61BT-71-1010 3 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH61BT-71-1010 4 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH61BT-71-1010	4 OF 4	1

A.1.4.10.9 NUHOMS® 61BTH DSC DRAWINGS

This section contains drawings for the NUHOMS® 61BTH DSC.

PARTS LIST

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 1
TRANSPORTABLE CANISTER FOR BWR FUEL
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH61BTH-71-1000	NONE	1 OF 5

8 7 6 5 4 3 2 1

NUH61BTH-71-1000 2 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

NUH61BTH-71-1000 4 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

8 7 6 5 4 3 2 1

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH61BTH-71-1000	5 OF 5	1

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
1	REVISED PER NRC RAI #1 2-33	04/02/10
0	FIRST ISSUE	03/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269 TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 2
TRANSPORTABLE CANISTER FOR BWR FUEL
MAIN ASSEMBLY

DRAWING NO. NUH61BTH-71-1100 | SCALE NONE | SHEET 1 OF 7

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH61BTH-71-1100	2 OF 7	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO NUH61BTH-71-1100 SHEET 5 OF 7 REVISION 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO. NUH61BTH-71-1100 | SHEET 6 OF 7 | REVISION 2

8 7 6 5 4 3 2 1

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH61BTH-71-1100	7 OF 7	2

SECURITY RELATED INFORMATION

NUH61BTH-71-1101 1 OF 2

ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PARTS LIST

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 2 TRANSPORTABLE CANISTER FOR BWR FUEL SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH61BTH-71-1101	NONE	1 OF 2

NUH61BTH-71-1101 2 OF 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
1	REMOVE NON REQUIRED PT	04/12/10
0	FIRST ISSUE	03/26/09

ALL DIMENSIONS ARE NOMINAL UNLESS A SPECIFIC TOLERANCE IS INDICATED WITH THE DRAWING DIMENSION

DIMENSIONS ARE IN INCHES AND DEGREES UNLESS OTHERWISE SPECIFIED. DIMENSIONING IN ACCORDANCE WITH ANSI Y14.5M-1994.

INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
TRANSNUCLEAR, INC

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 2
TRANSPORTABLE CANISTER FOR BWR FUEL BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH61BTH-71-1102	NONE	1 OF 8

NUH61BTH-71-1102 1 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH61BTH-71-1102	2 OF 8	2

DRAWING NO. NUH61BTH-71-1102 SHEET 2 OF 8

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH61BTH-71-1102	4 OF 8	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH61BTH-71-1102	6 OF 8	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH61BTH-71-1102	8 OF 8	2

SECURITY RELATED INFORMATION

NUH61BTH-71-1103 | 1 OF 2

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017 AND EDITORIAL CHANGES	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

U.S. PATENT NO. 4,780,269
PROPRIETARY PROPERTY OF TRANSNUCLEAR, INC

TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 2
TRANSPORTABLE CANISTER FOR BWR FUEL
TRANSITION RAILS

DRAWING NO	SCALE	SHEET
NUH61BTH-71-1103	NONE	1 OF 2

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

SECURITY RELATED INFORMATION

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE	03/26/09

	NAME / INITIALS	DATE
P.E.		
NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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TRANSNUCLEAR
AN AREVA COMPANY

SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 2 TRANSPORTABLE CANISTER FOR BWR FUEL DAMAGED FUEL END CAPS

DRAWING NO. NUH61BTH-71-1104 | SCALE NONE | SHEET 1 OF 1

SECURITY RELATED INFORMATION

PARTS LIST						
ITEM	QTY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	QUALITY CATEGORY	CODE CRITERIA

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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	NAME / INITIALS	DATE
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NUCLEAR		
MECHANICAL THERMAL		
STRUCTURAL		
CHECKED		
DRAWN		

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SAFETY ANALYSIS REPORT
NUHOMS® 61BTHF TYPE 2 TRANSPORTABLE CANISTER FOR BWR FUEL FAILED FUEL CAN

DRAWING NO. NUH61BTH-71-1105 | SCALE NONE | SHEET 1 OF 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
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SAFETY ANALYSIS REPORT
NUHOMS® 61BTH TYPE 2
TRANSPORTABLE CANISTER FOR BWR FUEL
TOP GRID ASSEMBLY ALTERNATE 3

DRAWING NO.	SCALE	SHEET
NUH61BTH-71-1106	NONE	1 OF 2

DRAWING NO. NUH61BTH-71-1106 SHEET 1 OF 2

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH61BTH-71-1106	2 OF 2	2

A.1.4.10.10 NUHOMS® 69BTH DSC DRAWINGS

This section contains drawings for the NUHOMS® 69BTH DSC.

NUH69BTH-71-1001 1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
1	REVISED PER NRC RAI #1 2-33, FABRICABILITY ENHANCEMENTS & EDITORIAL CORRECTIONS	04/14/10
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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1001	NONE	1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1001	2 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1001	4 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
BASKET-SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1002	NONE	1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1002	3 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1002	4 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED FOR DCR NUH09-017	03/15/11
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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
SHELL ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1003	NONE	1 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1003	2 OF 4	2

NUH69BTH-71-1003 3 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH69BTH-71-1003	3 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUH69BTH-71-1003	4 OF 4	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
3	REVISED PER DCR NUH69BTH-009	01/28/11
2	REVISED PER DCR NUH69BTH-007	07/14/10
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
ALTERNATE 2 TOP CLOSURE

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1004	NONE	1 OF 6

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

H
G
F
E
D
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B
A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1004	2 OF 6	3

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

NUH69BTH-71-1004 3 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1004	3 OF 6	3

DRAWING NO. NUH69BTH-71-1004 SHEET 4 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1004	4 OF 6	3

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO. NUH69BTH-71-1004 SHEET 5 OF 6 REVISION 3

DRAWING NO. NUH69BTH-71-1004 SHEET 6 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO. NUH69BTH-71-1004 SHEET 6 OF 6 REVISION 3

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH69BTH-009	01/28/11
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
BASKET ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1011	NONE	1 OF 5

NUH69BTH-71-1011 2 OF 5

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1011	2 OF 5	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1011	5 OF 5	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
2	REVISED PER DCR NUH09-017	03/15/11
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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
TRANSITION RAIL ASSEMBLY AND DETAILS

DRAWING NO: NUH69BTH-71-1012 | SCALE: NONE | SHEET: 1 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1012	2 OF 6	2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1012	3 OF 6	2

DRAWING NO. NUH69BTH-71-1012 SHEET 3 OF 6

8 7 6 5 4 3 2 1

NUH69BTH-71-1012 | 4 OF 6

H G F E D C B A

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUH69BTH-71-1012	4 OF 6	2

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

NUH69BTH-71-1012 6 OF 6

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO. NUH69BTH-71-1012 SHEET 6 OF 6 REVISION 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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SAFETY ANALYSIS REPORT
NUHOMS®69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
HOLDDOWN RING ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1013	NONE	1 OF 2

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

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0	FIRST ISSUE	03/26/09
REVISION	DESCRIPTION	DATE

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SAFETY ANALYSIS REPORT
NUHOMS® 69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
DAMAGED FUEL MODIFICATION

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1014	NONE	1 OF 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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SAFETY ANALYSIS REPORT
NUHOMS®69BTH
TRANSPORTABLE CANISTER FOR BWR FUEL
DAMAGED FUEL END CAPS

DRAWING NO.	SCALE	SHEET
NUH69BTH-71-1015	NONE	1 OF 1

A.1.4.10.11 Radioactive Waste Canister Drawing

This section contains drawings for the Radioactive Waste Canister.

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
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SAFETY ANALYSIS REPORT
NUHOMS® SYSTEM
RWC CANISTER-WELDED TOP SHIELD PLUG DESIGN
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUHRWC-71-1001	NONE	1 OF 5

PROPRIETARY AND
SECURITY RELATED INFORMATION
WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUHRWC-71-1001	2 OF 5	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO. NUHRWC-71-1001 | SHEET 4 OF 5 | REVISION 1

8 7 6 5 4 3 2 1

NUHRWC-71-1001 | 5 OF 5

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PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUHRWC-71-1001	5 OF 5	1

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

REVISION	DESCRIPTION	DATE
1	REVISED PER DCR NUH09-017	03/15/11
0	FIRST ISSUE PER RAI #1 2-6	04/07/10

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INTERPRET WELD SYMBOLS PER ANSI / AWS 2.4

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TRANSNUCLEAR
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SAFETY ANALYSIS REPORT
NUHOMS® SYSTEM
RWC CANISTER-WELDED TOP SHIELD PLUG DESIGN
INNER LINER

DRAWING NO.	SCALE	SHEET
NUHRWC-71-1002	NONE	1 OF 3

DRAWING NO. NUHRWC-71-1002	SHEET 2 OF 3	

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUHRWC-71-1002	2 OF 3	1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO	SHEET	REVISION
NUHRWC-71-1002	3 OF 3	1

NUHRWC-71-1002 3 OF 3

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

0	FIRST ISSUE PER RAI 1# 2-6	04/07/10
REVISION	DESCRIPTION	DATE

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SAFETY ANALYSIS REPORT
NUHOMS® SYSTEM
RWC CANISTER-BOLTED TOP SHIELD PLUG DESIGN
MAIN ASSEMBLY

DRAWING NO.	SCALE	SHEET
NUHRWC-71-1003	NONE	1 OF 4

8 7 6 5 4 3 2 1

H G F E D C B A

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

H G F E D C B A

DRAWING NO.	SHEET	REVISION
NUHRWC-71-1003	2 OF 4	0

8 7 6 5 4 3 2 1

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUHRWC-71-1003	3 OF 4	0

NUHRWC-71-1003 4 OF 4

PROPRIETARY AND SECURITY RELATED INFORMATION WITHHELD UNDER 10 CFR 2.390

DRAWING NO.	SHEET	REVISION
NUHRWC-71-1003	4 OF 4	0