

PROPOSED APPENDIX B

**APPROVED CONTENTS
FOR THE MAGNASTOR SYSTEM**

AMENDMENT NO. 17

Table of Contents

1.0 FUEL SPECIFICATIONS AND LOADING CONDITIONS.....	B1-1
2.0 FUEL TO BE STORED IN THE MAGNASTOR SYSTEM.....	B2-1
3.0 FUEL BEARING MATERIAL TO BE STORED IN THE MAGNASTOR SYSTEM.....	B3-1

List of Figures

Figure B2-1 Schematic of PWR 37-Assembly Basket.....	B2-12
Figure B2-2 [DELETED].....	B2-13
Figure B2-3 [DELETED].....	B2-13
Figure B2-4 Schematic of BWR 89-Assembly Basket.....	B2-29
Figure B2-5 Schematic of BWR 81-Assembly DF Basket.....	B2-30
Figure B2-6 BWR Partial Length Fuel Rod Location Sketches	B2-31

List of Tables

Table B2-1 TSC with PWR Fuel Limits	B2-2
Table B2-2 PWR Fuel Loading Patterns	B2-5
Table B2-3 Bounding PWR Fuel Assembly Physical Characteristics	B2-7
Table B2-4 Bounding PWR Fuel Assembly Loading Criteria – Enrichment/Soluble Boron Limits	B2-8
Table B2-5 Additional SNF Assembly Cool Time Required to Load NONFUEL HARDWARE	B2-10
Table B2-6 Allowed BPAA/NSA Burnup and Cool Time Combinations	B2-11
Table B2-7 Allowed GTPD/NSA Burnup and Cool Time Combinations	B2-11
Table B2-8 [DELETED].....	B2-11
Table B2-9 TSC with BWR Fuel Limits	B2-14
Table B2-10 BWR SNF Assembly Characteristics	B2-16
Table B2-10a BWR 89-Assembly Basket Fuel Loading Patterns	B2-17
Table B2-10b BWR 81-Assembly (DF) Basket Fuel Loading Patterns	B2-18
Table B2-10c [DELETED].....	B2-18
Table B2-10d [DELETED].....	B2-18
Table B2-11 BWR SNF Assembly Loading Criteria	B2-19
Table B2-12 BWR 89-Assembly Basket SNF Assembly Loading Criteria – Enrichment Limits	B2-20
Table B2-12a BWR 89-Assembly Basket SNF Assembly Loading Criteria – Reduced Neutron Absorber Content - Enrichment Limits.....	B2-21
Table B2-12b BWR 89-Assembly Basket SNF Assembly Loading Criteria – 89-Assembly Load - Absorber 0.027 ¹⁰ B g/cm ² – Preferential Loading Enrichment Limits.....	B2-22
Table B2-12c BWR 89-Assembly Basket SNF Assembly Loading Criteria – Absorber 0.027 ¹⁰ B g/cm ² – Preferential Load/Underload Combination Enrichment Limits.....	B2-23
Table B2-12d BWR 81-Assembly Basket SNF Assembly Loading Criteria – Enrichment Limits.....	B2-24

Table B2-12e	BWR 81-Assembly Basket SNF Assembly Loading Criteria – 81-Assembly Load - Preferential Loading Enrichment Limits.....	B2-25
Table B2-12f	BWR 81-Assembly Basket SNF Assembly Loading Criteria - Preferential Load/Underload Combination Enrichment Limits.....	B2-26
Table B2-12g	BWR Load Pattern Identifier Underload/Empty Location Key	B2-27
Table B2-12h	BWR CILC Fuel Assembly Enrichment Limits.....	B2-28
Table B2-13	[DELETED]	B2-32
Table B2-14	[DELETED]	B2-32
Table B2-15	[DELETED]	B2-32
Table B2-16	[DELETED]	B2-32
Table B2-17	[DELETED]	B2-32
Table B2-18	[DELETED]	B2-32
Table B2-19	[DELETED]	B2-32
Table B2-20	[DELETED]	B2-32
Table B2-21	[DELETED]	B2-32
Table B2-22	[DELETED]	B2-32
Table B2-23	[DELETED]	B2-32
Table B2-24	[DELETED]	B2-32
Table B2-25	[DELETED]	B2-32
Table B2-26	[DELETED]	B2-32
Table B2-27	[DELETED]	B2-32
Table B2-28	[DELETED]	B2-32
Table B2-29	[DELETED]	B2-32
Table B2-30	[DELETED]	B2-32
Table B2-31	[DELETED]	B2-32
Table B2-32	[DELETED]	B2-32
Table B2-33	[DELETED]	B2-32
Table B2-34	[DELETED]	B2-32
Table B2-35	[DELETED]	B2-32
Table B2-36	[DELETED]	B2-32
Table B2-37	[DELETED]	B2-32
Table B2-38	[DELETED]	B2-32
Table B2-39	[DELETED]	B2-32
Table B2-40	[DELETED]	B2-32
Table B2-41	[DELETED]	B2-32
Table B2-42	[DELETED]	B2-32
Table B2-43	[DELETED]	B2-32
Table B3-1	FBM TSC with FBM Limits	B3-2
Table B3-2	FBM TSC with Fuel Bearing Material Limits	B3-3

1.0 FUEL SPECIFICATIONS AND LOADING CONDITIONS

The MAGNASTOR SYSTEM is designed to safely store up to 37 undamaged PWR fuel assemblies in the 37 PWR Basket Assembly or up to 89 undamaged BWR fuel assemblies in the BWR Basket Assembly. The PWR DF basket has a capacity of up to 37 undamaged PWR fuel assemblies including 4 DFC locations. The BWR DF basket has a capacity of up to 81 undamaged BWR fuel assemblies including 12 DFC locations. Each DFC may contain an undamaged fuel assembly, a damaged fuel assembly, or FUEL DEBRIS equivalent to one fuel assembly. FUEL DEBRIS is included in the definition of DAMAGED FUEL (Appendix A, Section 1.1). UNDAMAGED FUEL assemblies may be placed directly in the DFC locations of a DF Basket Assembly without the use of a DFC.

The FBM TSC is designed to safely store Fuel Bearing Material (FBM) in a Waste Basket Liner (WBL) within the FBM TSC.

The system requires few operating controls. The principal controls and limits for MAGNASTOR are satisfied by the selection of fuel for storage that meets the Approved Contents presented in this section and in the tables for MAGNASTOR design basis spent fuels.

If any Fuel Specification or Loading Condition of this section is violated, the following actions shall be completed:

- The affected fuel assemblies or FBM shall be placed in a safe condition.
- Within 24 hours, notify the NRC Operations Center.
- Within 60 days, submit a special report that describes the cause of the violation and actions taken to restore or demonstrate compliance and prevent reoccurrence.

2.0 FUEL TO BE STORED IN THE MAGNASTOR SYSTEM

UNDAMAGED PWR FUEL ASSEMBLIES, DAMAGED PWR FUEL ASSEMBLIES, PWR FUEL DEBRIS (PWR DAMAGED FUEL), UNDAMAGED BWR FUEL ASSEMBLIES, DAMAGED BWR FUEL ASSEMBLIES, BWR FUEL DEBRIS (BWR DAMAGED FUEL), and NONFUEL HARDWARE meeting the limits specified in this section may be stored in the MAGNASTOR SYSTEM.

Table B2-1 TSC with PWR Fuel Limits

I. TSC with PWR Basket Assembly and PWR DF Basket Assembly	
A. Allowable Contents	
1. Uranium PWR UNDAMAGED SNF ASSEMBLIES and DAMAGED FUEL (PWR DAMAGED SNF ASSEMBLIES or PWR FUEL DEBRIS) that meet the following specifications:	
a. Cladding Type:	Zirconium-based alloy.
b. Physical Characteristics	The physical characteristics of the different PWR SNF ASSEMBLIES are defined in Table B2-3.
c. Maximum Enrichment	The fuel type specific maximum enrichments as a function of neutron absorber sheet areal density at various minimum soluble boron levels are defined in Table B2-4. For variable enrichment SNF assemblies, maximum SNF enrichments represent peak rod/pellet enrichments.
d. Decay Heat per SNF Assembly	Load pattern dependent allowed heat loads for each fuel storage location illustrated in Figure B2-1 are shown in Table B2-2. Fuel assembly and non-fuel hardware heat load to be evaluated based on discharged, or bounding, depletion and fuel assembly characteristics and total must be less than or equal to listed limit. Input into this heat load calculation is the SNF assembly average burnup (maximum for groups of assemblies) and assembly average enrichment (minimum for groups of assemblies). The maximum fuel assembly burnup is 70 GWd/MTU.
e. Nominal Fresh SNF Assy: Length (in)	≤ 178.3
f. Nominal Fresh SNF Assembly Width (in.):	≤ 8.54
g. Weight Per Storage location (lbs.)	≤ 1,765, including SNF Assembly, NONFUEL HARDWARE, and fuel spacer ≤ 1,814, including SNF Assembly, NONFUEL HARDWARE, DFC and fuel spacer in a DF location
h. Non-DF Basket -Total Canister Contents Weight (lbs.)	≤ 62,160, including SNF Assemblies, NONFUEL HARDWARE, and fuel spacers
i. DF Basket – Total Canister Contents Weight (lbs.)	≤ 61,184, including SNF Assemblies, NONFUEL HARDWARE, DFCs and fuel spacers
j. Total Canister Weight including Contents (lbs.)	≤ 104,500 (nominal TSC weight plus maximum contents)

(continued)

Table B2-1 TSC with PWR Fuel Limits (continued)

- B. Quantity per TSC: Up to a total of 37 PWR UNDAMAGED SNF ASSEMBLIES including up to four (4) DFCs containing PWR UNDAMAGED SNF ASSEMBLIES, PWR DAMAGED SNF ASSEMBLIES, and/or PWR FUEL DEBRIS. DFCs may only be loaded in the DFC basket and are limited to locations No. 4, 8, 30 and 34, as shown on Figure B2-1.
- C. The contents of a DFC must be less than, or equivalent to, one PWR UNDAMAGED SNF ASSEMBLY. PWR SNF ASSEMBLIES loaded in a DFC shall not contain NONFUEL HARDWARE with the exception of instrument tube tie components, guide tube anchors or steel inserts, and similar devices.
- D. SNF assembly lattices not containing the nominal number of fuel rods specified in Table B2-3 must contain solid filler rods that displace a volume equal to, or greater than, that of the fuel rod that the filler rod replaces. An unenriched rod may be used as a replacement rod to return a fuel assembly to an undamaged condition. SNF assemblies may have stainless steel rods inserted to displace guide tube “dashpot” water.
- E. PWR UNDAMAGED SNF ASSEMBLIES not loaded in a DFC may contain NONFUEL HARDWARE. SNF assembly lattices not containing the nominal number of fuel rods specified in Table B2-3 must contain solid filler rods that displace a volume equal to, or greater than, that of the fuel rod that the filler rod replaces. SNF assemblies may have stainless steel rods inserted to displace guide tube “dashpot” water. NONFUEL HARDWARE cool times shall be in accordance with Tables B2-5, B2-6, and B2-7. Alternatively, the ⁶⁰Co curie limits in Tables B2-6 and B2-7 may be used to establish site-specific NONFUEL HARDWARE constraints. Alternatively, the ⁶⁰Co curie limits in Tables B2-6 and B2-7 may be used to establish site-specific NONFUEL HARDWARE constraints.
- F. Spacers may be used in a TSC to axially position PWR UNDAMAGED SNF ASSEMBLIES, and DFCs to facilitate handling and operation.
- G. Unenriched fuel assemblies and unirradiated (i.e., not inserted in-core) fuel assemblies are not authorized for loading. Unenriched end blankets are permitted, provided that the nominal length of the end blanket is not greater than six (6) inches. Low enriched and annular fuel pellet end blankets are permitted without a restriction on length.”
- H. RCCs are limited to fuel cell location, minimum cool time, and maximum exposure based on load pattern and fuel type:

Minimum Cool Time (years)	Maximum Exposure (GWd/MTU)	Fuel Type	Load Pattern	Allowed Fuel Storage Locations (per Figure B2-1)
1.75	75	BW15x15	E, F, G, H	A, B, C
10	180	All	All	A
2.5		WE14x14	A, C	A
5.0		CE16x16	A, C	A
14	270	All	All	A
3.75	315	BW15x15	E, F, G, H	A, B, C
20	360	All	All	A

(continued)

Table B2-1 TSC with PWR Fuel Limits (continued)

- I. One Neutron Source, or Neutron Source Assembly (NSA) is permitted to be loaded in a TSC in fuel storage locations No. 11, 12, 13, 18, 19, 20, 25, 26 or 27 (Figure B2-1). Neutron source assemblies may contain source rods attached to hardware similar in configuration to guide tube plug devices (thimble plugs) and burnable absorbers, in addition to containing burnable poison rodlets and/or thimble plug rodlets. For NSAs containing absorber rodlets, the BPAA cool time and burnup/exposure or hardware ⁶⁰Co curie limit listed in Table B2-6 are applied to the neutron sources. NSAs having only thimble plug rodlets require the thimble plug restriction in Table B2-7 to be applied. Combination NSAs, containing both thimble plug and burnable absorber rodlets must apply the more limiting of the two minimum cool time/curie limit.
- J. Fuel assemblies may contain any number of unirradiated (i.e., not inserted in-core) nonfuel solid filler fuel replacement rods. Steel rods are limited to a 32.5 GWd/MTU maximum burnup/exposure. In-core activated stainless steel rods are limited to minimum cool time, quantity and fuel storage locations:

Fuel Storage Location (per Figure B2-1)	Number of Assemblies per Cask	Maximum number of Rods per Assembly and Minimum Cool Time
Any	1	Maximum of 5 rods

- K. Fuel assemblies may contain an HFRA at a maximum burnup/exposure of 4.0 GWd/MTU and a minimum cool time of 16 years.
- L. PLSA assemblies are permitted for loading provided they are limited to Region A (center 9 basket storage locations) at a maximum assembly average burnup of 40 GWd/MTU, a minimum assembly average enrichment of 1.2 wt% U-235 and a minimum cool time of 6.5 years.

Table B2-2 PWR Fuel Loading Patterns

Storage Location	Loading Pattern and Maximum Heat Load per Storage Location (W) ⁽¹⁾												
	A	B	C	E	F	G	H	I	J	K	L	M	N
A1	959	922	513	425	350	350	300	1380 ⁽³⁾	600	600	800	500	N/A ⁽⁵⁾
A2				800	800	800	800		400	400	500	400	
A3				425	350	350					800	500	
B1		1,200	1,800	1,300	1,000	2,500	2,000		1250	700	1025	1200	2000
B2				1,300	1,100	900	600		800	800		1900	
B3			250	250	700	700							
C1		800	830	950	1,800	800	800		1250	800	1800	1600	2750
C2				900	900	350	750		800	2500		1200	N/A ⁽⁵⁾
C3				1,000		2,000	2,050		1250	800		2700	3000
C4				3,400	2,800	1,500	1,500		3250	2700		3000	
C5	--			150	950	950	800	2500	1200	N/A ⁽⁵⁾			
Max Heat Load per Cask	35,500	35,500	35,500	35,500	35,500	35,500	35,500	42,500	42,000	42,000	48,000	48,000	53,000
Pattern Use Limits on Cask Configuration	Note ⁽⁴⁾	Note ⁽⁴⁾	PMTC not Permitted	MTC2 and CC6	MTC2 and CC6	MTC2 and CC6	MTC2 and CC6	Only permitted with LMTC and CC with 3" Liner and Heat Shield.					
Pattern Use Limits on Fuel Type	Note ⁽²⁾	None	CE16H1 or WE14×14 Only	BW15×15	BW15×15	BW15×15	BW15×15	Excludes CE14×14, WE14×14, and CE16H2					

Notes for Table B2-2:

- Storage locations per Figure B2-1.
 - Listed heat load is combined total of fuel assembly and nonfuel hardware, if applicable.
 - All Fuel types listed in Table B2-3 are permitted in Concrete Casks
- (1) Loading patterns are referred to in the FSAR as follows:
- A – Uniform Loading Pattern
 - B – Preferential Three-Zone Loading Pattern
 - C – Preferential Four-Zone Loading Pattern (with Reduced Cool Times)
 - D – DELETED
 - F – Loading Pattern - X
 - F – Loading Pattern - Y
 - G – Loading Pattern - Z
 - H – Loading Pattern – Z-Prime
 - I – Loading Pattern I or 37P-I
 - J – Loading Pattern J or 37P-J
 - K – Loading Pattern K or 37P-K
 - L – Loading Pattern L or 37P-L
 - M – Loading Pattern M or 37P-M
 - N – Loading Pattern N or 37P-N
- (2) MSO Loading Pattern Limitations:
- The MSO is only permitted for use with this pattern and fuel assembly types WE14x14, WE17x17, and CE16x16 (only Subtype CE16H1).
 - The TSCs stored in the MSO shall not contain NONFUEL HARDWARE.
- (3) Loading Pattern I with heat load in any storage location above 1148 W (uniform load) requires the following additional limits:
- a. Assemblies with highest loads must be stored in Zone B.
 - b. Assemblies with lowest heat loads must be stored in Zone A, the lowest heat load in location A2.
 - c. Empty storage locations must be considered as zero (0) watt heat load assemblies in the context of limits (3)a. and (3)b..
- (4) PMTC use limited to these patterns. PMTC may only be used with CE 16×16 fuel. TSC with lid recess for loading of neutron source rods is limited to use in the PMTC (loading/transfer) and CC5 (storage) configurations.
- (5) Storage location occupied by thermal shunt.

Table B2-3 Bounding PWR Fuel Physical Characteristics³

Assembly Type	Assembly Subtype	No. of Fuel Rods	No. of Guide Tubes ¹	Geometry ²					
				Max Pitch (inch)	Min Clad OD (inch)	Min Clad Thick. (inch)	Max Pellet OD (inch)	Max Active Length (inch)	Max Load (MTU)
BW15x15	BW15H1	208	17	0.568	0.43	0.0265	0.3686	144.0	0.4858
	BW15H2	208	17	0.568	0.43	0.025	0.3735	144.0	0.4988
	BW15H3	208	17	0.568	0.428	0.023	0.3742	144.0	0.5006
	BW15H4	208	17	0.568	0.414	0.022	0.3622	144.0	0.4690
	BW15H5	208	17	0.568	0.422	0.0243	0.3659	144.0	0.4787
BW17x17	BW17H1	264	25	0.502	0.377	0.022	0.3252	144.0	0.4799
CE14x14	CE14H1	176	5	0.58	0.44	0.026	0.3805	137.0	0.4167
CE16x16	CE16H1	236	5	0.5063	0.382	0.025	0.3255	150.0	0.4463
	CE16H2	236	5	0.5063	0.374	0.0225	0.3225	150.0	0.4395
WE14x14	WE14H1	179	17	0.556	0.40	0.0162	0.3674	145.2	0.4188
WE15x15	WE15H1	204	21	0.563	0.422	0.0242	0.3669	144.0	0.4720
	WE15H2	204	21	0.563	0.417	0.0265	0.357	144.0	0.4469
WE17x17	WE17H1	264	25	0.496	0.372	0.0205	0.3232	144.0	0.4740
	WE17H2	264	25	0.496	0.36	0.0225	0.3088	144.0	0.4327

¹ Combined number of guide and instrument tubes.

² Assembly characteristics represent cold, unirradiated, nominal configurations.

³ Assembly ID alphanumeric identifiers indicate (as applicable) vendor and/or base reactor core type forming the assembly hybrid. Loading of assemblies meeting the above limits is not restricted to the vendor(s) listed. Mixed loading of Assembly Types/Assembly Subtypes in a single TSC is permitted.

**Table B2-4 Bounding PWR Fuel Assembly Loading Criteria –
Enrichment/Soluble Boron Limits⁽²⁾**

Table B2-4 does not apply to FBM TSC

TSC Containing only Undamaged Fuel – Max. Initial Enrichment (wt % ²³⁵U)

Soluble Boron	Absorber ¹ 0.036 ¹⁰ B g/cm ²						Absorber ¹ 0.030 ¹⁰ B g/cm ²					Absorber ¹ 0.027 ¹⁰ B g/cm ²				
	1500 (ppm)	1750 (ppm)	2000 (ppm)	2250 (ppm)	2500 (ppm)	2650 (ppm)	1500 (ppm)	1750 (ppm)	2000 (ppm)	2250 (ppm)	2500 (ppm)	1500 (ppm)	1750 (ppm)	2000 (ppm)	2250 (ppm)	2500 (ppm)
BW15H1	3.7%	4.1%	4.4%	4.7%	5.0%	--	3.6%	4.0%	4.2%	4.5%	4.8%	3.6%	3.9%	4.2%	4.5%	4.8%
BW15H2	3.7%	4.0%	4.3%	4.6%	4.9%	5.0%	3.6%	3.9%	4.2%	4.5%	4.8%	3.6%	3.8%	4.1%	4.4%	4.7%
BW15H3	3.7%	4.0%	4.3%	4.6%	4.9%	--	3.6%	3.9%	4.2%	4.4%	4.7%	3.5%	3.8%	4.1%	4.4%	4.7%
BW15H4	3.8%	4.2%	4.5%	4.8%	5.0%	--	3.7%	4.1%	4.4%	4.7%	5.0%	3.7%	4.0%	4.3%	4.6%	5.0%
BW15H5	--	--	--	--	5.0%	--	--	--	--	--	--	--	--	--	--	--
BW17H1	3.7%	4.0%	4.3%	4.6%	4.9%	--	3.6%	3.9%	4.2%	4.5%	4.8%	3.6%	3.9%	4.1%	4.5%	4.7%
CE14H1	4.5%	4.8%	5.0%	5.0%	5.0%	--	4.3%	4.7%	5.0%	5.0%	5.0%	4.3%	4.6%	5.0%	5.0%	5.0%
CE16H1	4.4%	4.8%	5.0%	5.0%	5.0%	--	4.3%	4.6%	5.0%	5.0%	5.0%	4.2%	4.6%	4.9%	5.0%	5.0%
CE16H2	4.4%	4.8%	5.0%	5.0%	5.0%	----	4.3%	4.6%	5.0%	5.0%	5.0%	4.2%	4.6%	4.9%	5.0%	5.0%
WE14H1	4.7%	5.0%	5.0%	5.0%	5.0%	--	4.6%	5.0%	5.0%	5.0%	5.0%	4.5%	5.0%	5.0%	5.0%	5.0%
WE15H1	3.8%	4.2%	4.5%	4.8%	5.0%	--	3.7%	4.1%	4.4%	4.7%	5.0%	3.7%	4.0%	4.3%	4.6%	4.9%
WE15H2	4.0%	4.4%	4.7%	5.0%	5.0%	--	3.9%	4.2%	4.6%	4.9%	5.0%	3.8%	4.2%	4.5%	4.8%	5.0%
WE17H1	3.7%	4.1%	4.4%	4.7%	5.0%	--	3.7%	4.0%	4.3%	4.6%	4.9%	3.6%	3.9%	4.2%	4.5%	4.9%
WE17H2	4.0%	4.3%	4.7%	5.0%	5.0%	--	3.9%	4.3%	4.6%	4.9%	5.0%	3.8%	4.2%	4.5%	4.9%	5.0%

**Table B2-4 Bounding PWR Fuel Assembly Loading Criteria –
Enrichment/Soluble Boron Limits (continued) ⁽²⁾**

TSC Containing Damaged Fuel – Max. Initial Enrichment (wt % ²³⁵U)

Soluble Boron	Absorber ¹ 0.036 ¹⁰ B g/cm ²						Absorber ¹ 0.030 ¹⁰ B g/cm ²					Absorber ¹ 0.027 ¹⁰ B g/cm ²				
	1500 (ppm)	1750 (ppm)	2000 (ppm)	2250 (ppm)	2500 (ppm)	2650 (ppm)	1500 (ppm)	1750 (ppm)	2000 (ppm)	2250 (ppm)	2500 (ppm)	1500 (ppm)	1750 (ppm)	2000 (ppm)	2250 (ppm)	2500 (ppm)
BW15H1	3.7%	4.0%	4.3%	4.6%	4.9%	--	3.6%	3.9%	4.2%	4.5%	4.7%	3.6%	3.8%	4.1%	4.4%	4.7%
BW15H2	3.6%	3.9%	4.2%	4.5%	4.8%	5.0%	3.6%	3.8%	4.1%	4.4%	4.7%	3.5%	3.8%	4.1%	4.3%	4.6%
BW15H3	3.6%	3.9%	4.2%	4.5%	4.8%	--	3.5%	3.8%	4.1%	4.4%	4.6%	3.5%	3.8%	4.0%	4.3%	4.6%
BW15H4	3.8%	4.1%	4.4%	4.7%	5.0%	--	3.7%	4.0%	4.3%	4.6%	4.9%	3.6%	3.9%	4.2%	4.5%	4.8%
BW15H5	--	--	--	--	4.9%	--	--	--	--	--	--	--	--	--	--	--
BW17H1	3.6%	3.9%	4.2%	4.5%	4.8%	--	3.6%	3.9%	4.1%	4.4%	4.7%	3.5%	3.8%	4.1%	4.4%	4.6%
CE14H1	4.4%	4.8%	5.0%	5.0%	5.0%	--	4.3%	4.7%	5.0%	5.0%	5.0%	4.3%	4.6%	4.9%	5.0%	5.0%
CE16H1	4.4%	4.7%	5.0%	5.0%	5.0%	--	4.2%	4.6%	5.0%	5.0%	5.0%	4.2%	4.5%	4.9%	5.0%	5.0%
CE16H2	4.4%	4.7%	5.0%	5.0%	5.0%	----	4.2%	4.6%	5.0%	5.0%	5.0%	4.2%	4.5%	4.9%	5.0%	5.0%
WE14H1	4.6%	5.0%	5.0%	5.0%	5.0%	--	4.5%	5.0%	5.0%	5.0%	5.0%	4.5%	4.9%	5.0%	5.0%	5.0%
WE15H1	3.8%	4.1%	4.4%	4.7%	5.0%	--	3.7%	4.0%	4.3%	4.6%	4.9%	3.6%	4.0%	4.3%	4.6%	4.8%
WE15H2	3.9%	4.3%	4.6%	4.9%	5.0%	--	3.8%	4.2%	4.5%	4.8%	5.0%	3.8%	4.1%	4.4%	4.7%	5.0%
WE17H1	3.7%	4.0%	4.3%	4.6%	4.9%	--	3.6%	3.9%	4.2%	4.5%	4.8%	3.6%	3.9%	4.2%	4.5%	4.8%
WE17H2	3.9%	4.3%	4.6%	5.0%	5.0%	--	3.9%	4.2%	4.5%	4.9%	5.0%	3.8%	4.1%	4.5%	4.8%	5.0%

Notes

¹ Borated aluminum neutron absorber sheet effective areal ¹⁰B density

² Specified soluble boron concentrations are independent of whether an assembly contains a nonfuel insert.

When mixing fuel assembly types the bounding, i.e., the highest, minimum soluble boron content listed herein for the fuel assembly types loaded must be present in the TSC prior to loading.

Table B2-5 Additional SNF Assembly Cool Time Required to Load NONFUEL HARDWARE

Assembly		Pattern A	Pattern B			Pattern C			
		Storage Location	Storage Location			Storage Location			
		A	A	B	C	A	B1	B2	C
CE 14x14	BPAA/HFRA	--	--	--	--	--	--	--	--
	GTPD/NSA	--	--	--	--	--	--	--	--
	RCC	0.2	0.2	0.1	0.2	--	--	--	--
WE 14x14	BPAA/HFRA	0.5	0.5	0.2	0.7	1.4	0.1	0.1	0.7
	GTPD/NSA	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
	RCC	0.7	2.3	0.7	4.1	2.2	0.2	0.1	1.0
WE 15x15	BPAA/HFRA	0.5	0.6	0.2	0.8	--	--	--	--
	GTPD/NSA	0.1	0.1	0.1	0.1	--	--	--	--
	RCC	3.1	3.4	1.5	4.5	--	--	--	--
B&W 15x15 ²	BPAA/HFRA	0.1	0.1	0.1	0.1	--	--	--	--
	GTPD/NSA	0.1	0.1	0.1	0.1	--	--	--	--
	RCC	0.2	0.2	0.1	0.2	--	--	--	--
	APSR	--	--	--	--	--	--	--	--
CE 16x16	BPAA/HFRA	--	--	--	--	--	--	--	--
	GTPD/NSA	--	--	--	--	--	--	--	--
	RCC	0.4 ¹	0.2	0.1	0.3	0.8	0.1	0.1	0.4
WE 17x17	BPAA/HFRA	0.5	0.6	0.2	0.7	--	--	--	--
	GTPD/NSA	0.1	0.1	0.1	0.1	--	--	--	--
	RCC	2.9	3.3	1.4	4.3	--	--	--	--
B&W 17x17	BPAA/HFRA	0.1	0.1	0.1	0.1	--	--	--	--
	GTPD/NSA	0.1	0.1	0.1	0.1	--	--	--	--
	RCC	0.2	0.2	0.1	0.2	--	--	--	--

Note: Additional SNF assembly cooling time to be added to the minimum SNF assembly cool time based on SNF assembly initial enrichment and SNF assembly average burnup listed in Tables B2-15 through B2-22 and B2-25 through B2-43.

- ¹ 0.4 years for RCC in the PMTC (reduced storage location heat load). For all other cask types, 0.3 years for RCC with 5-year minimum cool time or 0.2 years for RCC with 10-year minimum cool time.
- ² APSRs are limited to B&W15x15 loaded in a CC6 Concrete Cask in load Patterns E, F, G, and H. Nonfuel hardware heat loads in Patterns E thru N must be added to fuel assembly heat loads when demonstrating compliance with Table B2-2 fuel storage location limits.

Table B2-6 Allowed BPAA/NSA Burnup and Cool Time Combinations

Maximum Burnup (GWd/MTU)	Minimum Cool Time (yrs)				
	WE 14×14	WE 15×15	B&W 15×15	WE 17×17	B&W 17×17
10	0.5	0.5	0.5	0.5	0.5
15	0.5	0.5	0.5	0.5	0.5
20	0.5	1.0	2.0	2.0	0.5
25	1.0	2.5	3.5	3.5	1.0
30	2.5	4.0	5.0	5.0	2.5
32.5	3.0	4.5	6.0 ¹	6.0	3.0
35	3.5	5.0	6.0	6.0	3.5
37.5	4.0	6.0	7.0	7.0	4.0
40	4.5	6.0	7.0	7.0	4.5
45	5.0	7.0	8.0	8.0	6.0
50	6.0	8.0	9.0	9.0	7.0
55	7.0	8.0	10.0	9.0	7.0
60	7.0	9.0	10.0	10.0	8.0
65	8.0	10.0	12.0	12.0	8.0
70	8.0	10.0	12.0	12.0	9.0
Max ⁶⁰ Co Activity (Ci)	718	733	19	637	26

Note: Specified minimum cool times for BPRAs are independent of the required minimum cool times for the fuel assembly containing the BPRA.

¹ For use in CC6 a minimum cool time of 1.75 years is permitted.

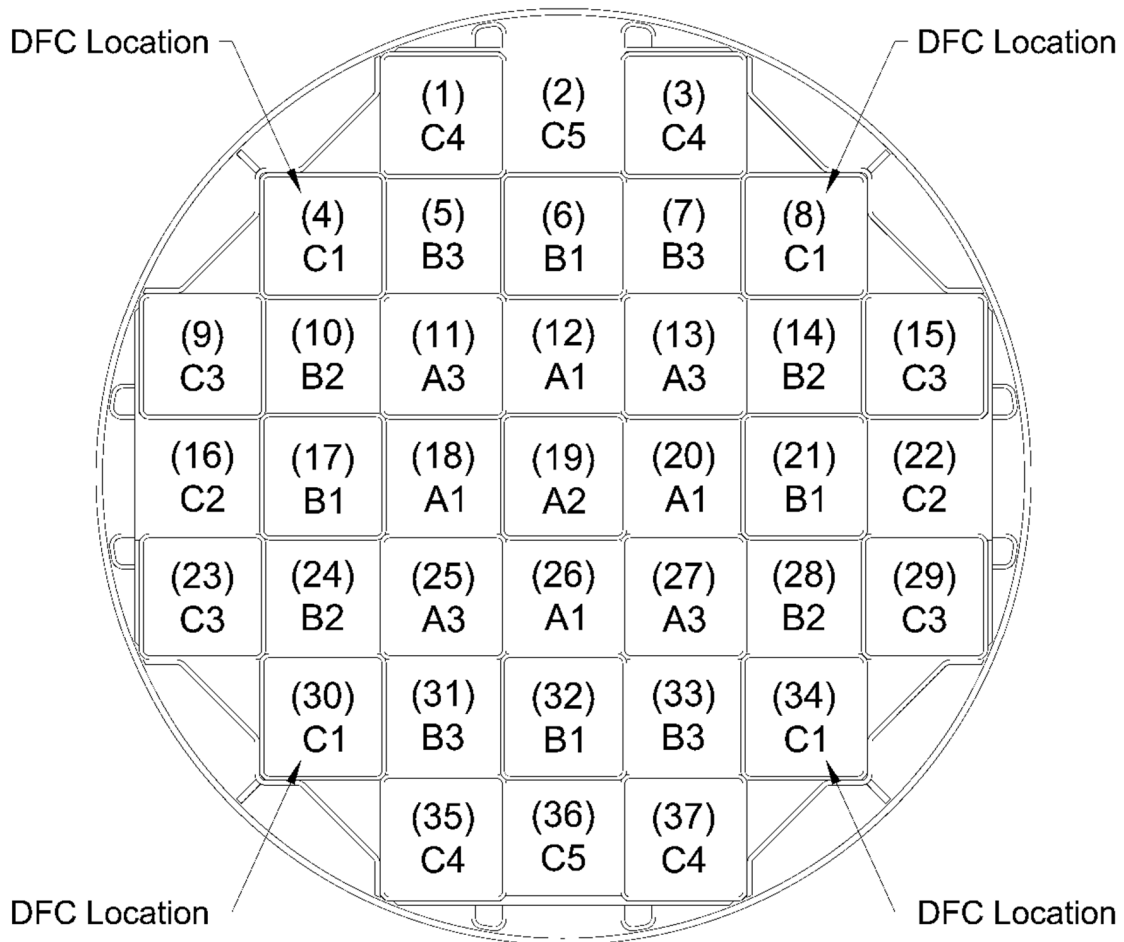
Table B2-7 Allowed GTPD/NSA Burnup and Cool Time Combinations

Maximum Burnup (GWd/MTU)	Minimum Cool Time (yrs)				
	WE 14×14	WE 15×15	B&W 15×15	WE 17×17	B&W 17×17
45	2.0	3.5	7.0	5.0	6.0
90	6.0	7.0	10.0	9.0	10.0
135	7.0	9.0	12.0	10.0	12.0
180	8.0	9.0	14.0	12.0	12.0
⁶⁰ Co Activity (Ci)	63.5	64.1	56.9	64.0	63.6

Note: Specified minimum cool times for thimble plugs are independent of the required minimum cool times for the fuel assembly containing the thimble plug.

Table B2-8 [DELETED]

Figure B2-1 Schematic of PWR 37-Assembly Basket



DFC designated locations may contain a loaded DFC or a PWR UNDAMAGED SNF ASSEMBLY. Figure applies to PWR Basket and PWR DF Basket.

“A1”, “A2”, “A3” may be referred to as storage location “A” when no differentiation of heat load is required between the various locations. Similarly, for group B and C locations.

Figure B2-2 [DELETED]

Figure B2-3 [DELETED]

Table B2-9 TSC with BWR Fuel Limits

I. TSC with BWR Basket Assembly and BWR DF Basket Assembly	
A. Allowable Contents	
1. Uranium BWR UNDAMAGED FUEL assemblies and DAMAGED FUEL (BWR DAMAGED SNF ASSEMBLIES or BWR FUEL DEBRIS) that meet the following specifications:	
a. Cladding Type:	Zirconium-based alloy.
b. Physical Characteristics	The physical characteristics of the different BWR SNF ASSEMBLIES are defined in Table B2-11.
c. Maximum Enrichment	Fuel type specific enrichment limits for the BWR fuel basket configurations are defined in Table B2-12 through B2-12f as a function of neutron absorber areal density, basket type (undamaged or damaged), number of assemblies loaded, and/or preferential loading. Underload locations are defined in Table B2-12g in relation to Figures B2-4 and B2-5.
d. Decay Heat per SNF Assembly:	Load pattern dependent allowed heat loads for each fuel storage location illustrated in Figure B2-4 for the undamaged 89-Assembly basket, and Table B2-5 for the 81-Assembly damaged basket are shown in Table B2-10a and B2-10b, respectively. Fuel assembly heat load to be evaluated based on discharged, or bounding, depletion and fuel assembly characteristics and total must be less than or equal to listed limit. Input into this heat load calculation is the SNF assembly average burnup (largest of the assembly average burnup in the group) and assembly average enrichment (lowest assembly average enrichment in the group). The maximum fuel assembly burnup is 60 GWd/MTU.
e. Nominal Fresh Fuel Design SNF Assembly Length (in.):	≤ 176.2
f. Nominal Fresh Fuel Design SNF Assembly Width (in.):	≤ 5.52
g. SNF Assembly Weight (lb):	≤ 704, including channels and spacers for non DF storage location and ≤ 804 for DF locations, including channels, the DFC and spacers.
h. Non-DF Basket - Total Canister Contents Weight (lbs.)	≤ 62,656, including SNF Assemblies, NONFUEL HARDWARE and fuel spacers

(continued)

Table B2-9 TSC with BWR Fuel Limits

I.A.1 (continued)

i. DF Basket -Total Canister Contents Weight (lbs.)	≤ 58,224, including SNF Assemblies, NONFUEL HARDWARE, DFCs and fuel spacers
j. Total Canister Weight including Contents (lbs.)	≤ 104,500 (nominal TSC weight plus maximum contents)

- B. Quantity per TSC: Up to a total of 89 BWR UNDAMAGED SNF ASSEMBLIES in the undamaged (89-Assembly) basket or up to a total of 81 BWR UNDAMAGED SNF ASSEMBLIES in the damaged fuel (81-Assembly). The damaged fuel basket may be loaded with up to twelve (12) DFCs containing BWR UNDAMAGED SNF ASSEMBLIES, BWR DAMAGED SNF ASSEMBLIES, and/or BWR FUEL DEBRIS. DFCs may only be loaded in the DFC basket and are limited to locations No. 4, 8, 9, 15, 16, 24, 58, 66, 67, 73, 74, and 78, as shown on Figure B2-5.
- C. The contents of a DFC must be less than, or equivalent to, one BWR UNDAMAGED SNF ASSEMBLY.
- D. BWR fuel assemblies may be unchanneled, or channeled with zirconium-based alloy channels.
- E. BWR fuel assemblies with stainless steel channels are not authorized.
- F. SNF Assembly lattices possessing less than the nominal number of undamaged fuel rods (see Table B2-11) must contain solid filler rods that displace a volume equal to, or greater than, that of the fuel rod that the filler rod replaces.
- G. Spacers may be used in a TSC to axially position BWR SNF assemblies to facilitate handling.
- H. Unirradiated (i.e., not inserted in-core) fuel assemblies are not authorized for loading. Unenriched axial blankets are permitted, provided that the nominal length of the blanket is not greater than six (6) inches.
- I. Assemblies identified as subject to CILC phenomena are authorized for loading without use of DFC provided the limits in Table B2-12h are met and the fuel assembly is channeled. Should the channel not be present a DFC is required and generic BWR DF limits apply.

Table B2-10 BWR SNF Assembly Characteristics

Characteristic	Fuel Class			
	7×7	8×8	9×9	10×10
Number of Fuel Rods	48/49	59/60/6 1/ 62/63/6 4	72/74 ^(a) /7 6/ 79/80	91 ^(a) /92 ^(a) / 96 ^(a) /100
Max Assembly Average Burnup (MWd/MTU)	60,000	60,000	60,000	60,000
Min Average Enrichment (wt % ²³⁵U)	0.7	0.7	0.7	0.7

- Each BWR fuel assembly may include a zirconium-based alloy channel.
- Water rods may occupy more than one fuel lattice location. Fuel assembly to contain nominal number of water rods for the specific assembly design.
- Spacers may be used to axially position fuel assemblies to facilitate handling.

^(a) Assemblies may contain partial-length fuel rods.

Table B2-10a BWR 89-Assembly Basket Fuel Loading Patterns

Loading Pattern and Maximum Heat Load per Storage Location (W) ⁽¹⁾								
Storage Location	A	B	C	D	E	F		
A1	379	533 ⁽²⁾	200	200	250	300		
A2					300			
A3					375			
B1			300	300	475	550	425	
B2							375	
B3							425	
C1							1100	1000
C2			950	900				
C3			600	600				
C4			350	450				
D1			450	450	600	600	550	
D2							925	
D3							500	
D4							925	
Max Heat Load per Cask			33,000	39,500	42,000	42,000	46,000	46,000
Pattern Use Limitations			None	3" Liner and Heat Shield CC / LMTC	3" Liner and Heat Shield CC / LMTC	3" Liner and Heat Shield CC / LMTC	3" Liner and Heat Shield CC / LMTC	3" Liner and Heat Shield CC / LMTC

Notes:

- Locations per Figure B2-4.

(1) Loading patterns are referred to in the FSAR as follows:

- A – Uniform Loading Pattern
- B – Loading Pattern A or 89B-A
- C – Loading Pattern B or 89B-B
- D – Loading Pattern C or 89B-C
- E – Loading Pattern E or 89B-E
- F – Loading Pattern F or 89B-F

- (2) Loading Pattern B with heat load in any storage location above 444W (uniform load) requires the following additional limits:
- a. Assemblies with highest loads must be stored in Zone C.
 - b. Assemblies with lowest heat loads must be stored in Zone A and B, with the lowest overall heat load in the center of Zone A and progressively increasing heat loads in the surrounding rings.
 - c. Empty storage locations must be considered as zero (0) watt heat load assemblies in the context of limits (2)a and (2)b

Table B2-10b BWR 81-Assembly (DF) Basket Fuel Loading Patterns

Loading Pattern and Maximum Heat Load per Storage Location (W) ⁽³⁾						
Storage Location	A	B	C	D	E	
A	585 ⁽⁴⁾	300	300	300	300	
B1		400	400	475	425	
B2					500	
C1		1100	1000	675	600	
C2		900	600			
C3		500		525	600	500
C4		475				
D1		425	675		600	
D2		475				
D3		500	600	600		
D4		475	525			
Max Heat Load per Cask		39,500	41,000	41,000	46,000	46,000
Pattern Use Limitations		3" Liner and Heat Shield CC / LMTC				

Notes:

- Locations per Figure B2-5.

⁽³⁾ Loading patterns are referred to in the FSAR as follows:

- A – Loading Pattern A or 81B-A
- B – Loading Pattern B or 81B-B
- C – Loading Pattern C or 81B-C
- D – Loading Pattern D or 81B-D
- E – Loading Pattern E or 81B-E

⁽⁴⁾ Loading Pattern A with heat load in any storage location above 488W (uniform load) requires the following additional limits:

- a. Assemblies with highest loads must be stored in Zone C.
- b. Assemblies with lowest heat loads must be stored in Zone A and B, with the lowest overall heat load in the center of Zone A and progressively increasing heat loads in the surrounding rings.
- c. Empty storage locations must be considered as zero (0) watt heat load assemblies in the context of limits (4)a. and (4)b

Table B2-10c [DELETED]

Table B2-10d [DELETED]

Table B2-11 BWR SNF Assembly Loading Criteria⁶

Assembly Type	Number of Fuel Rods	Number of Partial Length Rods ¹	Geometry ^{3,4}					Max Active Length (inch)	Max Loading (MTU)
			Max Pitch (inch)	Min Clad OD (inch)	Min Clad Thick. (inch)	Max Pellet OD (inch)	Max		
B7_48A	48	N/A	0.7380	0.5700	0.03600	0.4900	144.0	0.1981	
B7_49A	49	N/A	0.7380	0.5630	0.03200	0.4880	146.0	0.2034	
B7_49B	49	N/A	0.7380	0.5630	0.03200	0.4910	150.0	0.2115	
B8_59A	59	N/A	0.6400	0.4930	0.03400	0.4160	150.0	0.1828	
B8_60A	60	N/A	0.6417	0.4840	0.03150	0.4110	150.0	0.1815	
B8_60B	60	N/A	0.6400	0.4830	0.03000	0.4140	150.0	0.1841	
B8_61B	61	N/A	0.6400	0.4830	0.03000	0.4140	150.0	0.1872	
B8_62A	62	N/A	0.6417	0.4830	0.02900	0.4160	150.0	0.1921	
B8_63A	63	N/A	0.6420	0.4840	0.02725	0.4195	150.0	0.1985	
B8_64A	64	N/A	0.6420	0.4840	0.02725	0.4195	150.0	0.2017	
B8_64B ⁵	64	N/A	0.6090	0.4576	0.02900	0.3913	150.0	0.1755	
B9_72A	72	N/A	0.5720	0.4330	0.02600	0.3740	150.0	0.1803	
B9_74A	74 ²	8	0.5720	0.4240	0.02390	0.3760	150.0	0.1873	
B9_76A	76	N/A	0.5720	0.4170	0.02090	0.3750	150.0	0.1914	
B9_79A	79	N/A	0.5720	0.4240	0.02390	0.3760	150.0	0.2000	
B9_80A	80	N/A	0.5720	0.4230	0.02950	0.3565	150.0	0.1821	
B10_91A	91 ²	8	0.5100	0.3957	0.02385	0.3420	150.0	0.1906	
B10_92A	92 ²	14	0.5100	0.4040	0.02600	0.3455	150.0	0.1966	
B10_96A ⁵	96 ²	12	0.4880	0.3780	0.02430	0.3224	150.0	0.1787	
B10_100A ⁵	100	N/A	0.4880	0.3780	0.02430	0.3224	150.0	0.1861	

- ¹ Location of the partial length rods is illustrated in Figure B2-6.
- ² Assemblies may contain partial-length fuel rods.
- ³ Assembly characteristics represent cold, unirradiated, nominal configurations.
- ⁴ Maximum channel thickness allowed is 120 mils (nominal).
- ⁵ Composed of four subchannel clusters.
- ⁶ Mixed loading of Assembly Types in a TSC is permitted.

Table B2-12 BWR 89-Assembly Basket SNF Assembly Loading Criteria – Enrichment Limits

	Max. Initial Enrichment ^a (wt % ²³⁵ U)						
	Absorber ^b 0.027 ¹⁰ B g/cm ²						
	89-Assy	87-Assy	86-Assy	85-Assy	84-Assy	83-Assy	82-Assy
B7_48A	4.0%	4.5%	4.7%	5.0%	5.0%	5.0%	5.0%
B7_49A	3.8%	4.3%	4.5%	4.8%	5.0%	5.0%	5.0%
B7_49B	3.8%	4.3%	4.5%	4.8%	5.0%	5.0%	5.0%
B8_59A	3.9%	4.4%	4.6%	4.8%	5.0%	5.0%	5.0%
B8_60A	3.8%	4.3%	4.4%	4.7%	4.9%	5.0%	5.0%
B8_60B	3.8%	4.3%	4.4%	4.7%	4.9%	5.0%	5.0%
B8_61B	3.8%	4.3%	4.4%	4.7%	4.9%	4.9%	5.0%
B8_62A	3.8%	4.2%	4.4%	4.6%	4.8%	4.9%	5.0%
B8_63A	3.8%	4.2%	4.4%	4.6%	4.8%	4.9%	5.0%
B8_64A	3.8%	4.3%	4.4%	4.7%	4.9%	4.9%	5.0%
B8_64B	3.6%	4.0%	4.2%	4.4%	4.5%	4.6%	4.9%
B9_72A	3.8%	4.2%	4.4%	4.6%	4.8%	4.8%	5.0%
B9_74A	3.7% ^c	4.1%	4.2%	4.4%	4.6%	4.6%	4.8%
B9_76A	3.5%	3.9%	4.1%	4.3%	4.5%	4.5%	4.8%
B9_79A	3.7%	4.1%	4.3%	4.5%	4.7%	4.7%	5.0%
B9_80A	3.8%	4.3%	4.4%	4.7%	4.9%	4.9%	5.0%
B10_91A	3.7%	4.2%	4.3%	4.6%	4.8%	4.8%	5.0%
B10_92A	3.8%	4.2%	4.3%	4.6%	4.7%	4.8%	5.0%
B10_96A	3.7%	4.1%	4.2%	4.4%	4.6%	4.6%	4.8%
B10_100A	3.6%	4.1%	4.2%	4.4%	4.6%	4.7%	4.9%

^a Maximum planar average.

^b Borated aluminum neutron absorber sheet effective areal ¹⁰B density.

^c 3.85% in the 88-assembly configuration

**Table B2-12a BWR 89-Assembly Basket SNF Assembly Loading Criteria –
Reduced Neutron Absorber Content - Enrichment Limits**

	Max. Initial Enrichment^a (wt % 235U)			
	Absorber 0.0225 ¹⁰B g/cm²		Absorber 0.02 ¹⁰B g/cm²	
	84-Assy	84-Assy	84-Assy	84-Assy
B7_48A	3.7%	4.5%	3.6%	4.4%
B7_49A	3.6%	4.4%	3.5%	4.3%
B7_49B	3.6%	4.4%	3.5%	4.2%
B8_59A	3.7%	4.5%	3.6%	4.3%
B8_60A	3.7%	4.4%	3.5%	4.2%
B8_60B	3.6%	4.3%	3.5%	4.2%
B8_61B	3.6%	4.3%	3.5%	4.2%
B8_62A	3.6%	4.3%	3.5%	4.1%
B8_63A	3.6%	4.3%	3.4%	4.2%
B8_64A	3.6%	4.3%	3.5%	4.2%
B8_64B	3.4%	4.1%	3.3%	4.0%
B9_72A	3.6%	4.3%	3.4%	4.1%
B9_74A	3.4%	4.1%	3.4%	4.0%
B9_76A	3.4%	4.0%	3.3%	3.9%
B9_79A	3.4%	4.2%	3.3%	4.0%
B9_80A	3.6%	4.3%	3.5%	4.2%
B10_91A	3.6%	4.3%	3.5%	4.1%
B10_92A	3.6%	4.3%	3.5%	4.1%
B10_96A	3.5%	4.1%	3.4%	4.0%
B10_100A	3.5%	4.1%	3.4%	4.0%

^a Maximum planar average.

**Table B2-12b BWR 89-Assembly Basket SNF Assembly Loading Criteria –
89- Assembly Load - Absorber 0.027 ¹⁰B g/cm² –
Preferential Loading Enrichment Limits**

Outer Assembly ^a Enrichment Limit ^b (wt % ²³⁵ U)	4.6%	4.7%	4.8%
Assembly	Inner Assembly ^c Enrichment Limit ^b (wt % ²³⁵ U)		
B9_72A	3.6	3.5	3.5
B9_74A	3.4	3.3	3.2
B9_76A	3.2	3.2	3.1
B9_79A	3.4	3.4	3.3
B9_80A	3.7	3.6	3.6
B10_91A	3.5	3.5	3.5
B10_92A	3.5	3.5	3.5
B10_96A	3.4	3.4	3.3
B10_100A	3.4	3.3	3.2

^a Locations C1, C2, C4, D1, D2, 12, 18, 72, 78 in Figure B2-4.

^b Maximum planar average.

^c Locations A, B, C3 (except for Locations 12, 18, 72, 78) in Figure B2-4.

**Table B2-12c BWR 89-Assembly Basket SNF Assembly Loading Criteria –
Absorber 0.027 ¹⁰B g/cm² – Preferential Load/Underload
Combination Enrichment Limits**

# Assy Loaded / Pattern ID	87-Assembly Under Load			86-Assembly Under Load			85-Assembly Under Load		
	Outer Assembly ^a Enrichment Limit ^b (wt% ²³⁵ U)								
	4.6%	4.7%	4.8%	4.6%	4.7%	4.8%	4.6%	4.7%	4.8%
	Inner Assembly ^c Enrichment Limit ^b (wt% ²³⁵ U)								
B9_72A	4.0%	3.9%	3.8%	4.2%	4.2%	4.1%	4.6%	4.5%	4.4%
B9_74A	3.7%	3.6%	3.5%	3.9%	3.9%	3.8%	4.3%	4.2%	4.1%
B9_76A	3.5%	3.4%	3.3%	3.8%	3.7%	3.6%	4.1%	4.0%	3.9%
B9_79A	3.8%	3.7%	3.6%	4.1%	4.0%	4.0%	4.4%	4.4%	4.3%
B9_80A	4.1%	4.1%	4.0%	4.4%	4.3%	4.2%	4.8%	4.7%	4.7%
B10_91A	4.0%	3.9%	3.8%	4.2%	4.1%	4.1%	4.6%	4.5%	4.4%
B10_92A	3.9%	3.9%	3.8%	4.2%	4.1%	4.1%	4.6%	4.5%	4.4%
B10_96A	3.7%	3.7%	3.6%	4.0%	3.9%	3.8%	4.3%	4.2%	4.1%
B10_100A	3.7%	3.7%	3.6%	4.0%	3.9%	3.8%	4.4%	4.3%	4.2%

^a Locations C1, C2, C4, D1, D2, 12, 18, 72, 78 in Figure B2-4.

^b Maximum planar average.

^c Locations A, B, C3 (except for Locations 12, 18, 72, 78) in Figure B2-4.

**Table B2-12d BWR 81-Assembly Basket SNF Assembly Loading Criteria –
Enrichment Limits**

Max # Assy in Basket	Max. Initial Enrichment ^a (wt % ²³⁵ U)						
	81-Assy	80-Assy	79-Assy	78-Assy	77-Assy	76-Assy	75-Assy
B7_48A	4.0%	4.3%	4.5%	5.0%	5.0%	5.0%	5.0%
B7_49A	3.9%	4.2%	4.4%	4.8%	4.9%	5.0%	5.0%
B7_49B	3.9%	4.2%	4.4%	4.8%	4.9%	5.0%	5.0%
B8_59A	4.0%	4.3%	4.5%	4.8%	5.0%	5.0%	5.0%
B8_60A	3.9%	4.2%	4.4%	4.7%	4.9%	5.0%	5.0%
B8_60B	3.9%	4.2%	4.4%	4.7%	4.9%	5.0%	5.0%
B8_61B	3.9%	4.2%	4.4%	4.7%	4.9%	5.0%	5.0%
B8_62A	3.8%	4.1%	4.3%	4.6%	4.8%	5.0%	5.0%
B8_63A	3.8%	4.1%	4.3%	4.6%	4.8%	5.0%	5.0%
B8_64A	3.9%	4.1%	4.3%	4.7%	4.8%	5.0%	5.0%
B8_64B	3.7%	4.0%	4.1%	4.4%	4.6%	4.7%	4.8%
B9_72A	3.8%	4.1%	4.3%	4.6%	4.8%	5.0%	5.0%
B9_74A	3.7%	4.0%	4.1%	4.4%	4.6%	4.8%	4.9%
B9_76A	3.6%	3.9%	4.0%	4.3%	4.5%	4.7%	4.8%
B9_79A	3.7%	4.0%	4.1%	4.5%	4.7%	4.8%	4.9%
B9_80A	3.9%	4.2%	4.4%	4.7%	4.8%	5.0%	5.0%
B10_91A	3.8%	4.1%	4.3%	4.6%	4.8%	4.9%	5.0%
B10_92A	3.8%	4.1%	4.3%	4.6%	4.8%	4.9%	5.0%
B10_96A	3.7%	4.0%	4.2%	4.4%	4.6%	4.8%	4.9%
B10_100A	3.7%	4.0%	4.1%	4.4%	4.6%	4.8%	4.9%

^a Maximum planar average.

**Table B2-12e BWR 81-Assembly Basket SNF Assembly Loading Criteria –
81 - Assembly Load - Preferential Loading Enrichment Limits**

Outer Assembly ^a Enrichment Limit ^b (wt % ²³⁵ U)	4.6%	4.7%	4.8%
Assembly	Inner Assembly ^c Enrichment Limit ^b (wt % ²³⁵ U)		
B9_72A	3.7	3.7	3.6
B9_74A	3.5	3.5	3.4
B9_76A	3.4	3.3	3.3
B9_79A	3.5	3.4	3.4
B9_80A	3.7	3.7	3.6
B10_91A	3.7	3.7	3.6
B10_92A	3.7	3.6	3.6
B10_96A	3.4	3.4	3.3
B10_100A	3.5	3.4	3.4

^a Locations C, D, F, G, H, I in Figure B2-5.

^b Maximum planar average.

^c Locations A, B, E in Figure B2-4.

**Table B2-12f BWR 81-Assembly Basket SNF Assembly Loading Criteria -
Preferential Load/Underload Combination Enrichment Limits**

# Assy Loaded / Pattern ID	80-Assembly Under Load			79-Assembly Under Load			78-Assembly Under Load		
Outer Assembly ^a Enrichment Limit ^b (wt% ²³⁵ U)	4.6%	4.7%	4.8%	4.6%	4.7%	4.8%	4.6%	4.7%	4.8%
	Inner Assembly ^c Enrichment Limit ^b (wt% ²³⁵ U)								
B9_72A	4.0%	3.9%	3.9%	4.2%	4.1%	4.1%	4.5%	4.4%	4.3%
B9_74A	3.7%	3.7%	3.7%	4.0%	3.9%	3.8%	4.2%	4.1%	4.1%
B9_76A	3.6%	3.5%	3.5%	3.8%	3.7%	3.6%	4.0%	3.9%	3.9%
B9_79A	3.7%	3.7%	3.6%	3.9%	3.9%	3.8%	4.2%	4.1%	4.3%
B9_80A	4.0%	3.9%	3.9%	4.3%	4.2%	4.1%	4.5%	4.5%	4.4%
B10_91A	3.9%	3.9%	3.8%	4.2%	4.1%	4.1%	4.4%	4.4%	4.3%
B10_92A	3.9%	3.9%	3.8%	4.1%	4.1%	4.1%	4.4%	4.4%	4.3%
B10_96A	3.7%	3.6%	3.6%	3.9%	3.8%	3.7%	4.2%	4.1%	4.0%
B10_100A	3.7%	3.6%	3.6%	3.9%	3.8%	3.8%	4.2%	4.1%	4.0%

^a Locations C, D, F, G, H, I in Figure B2-5.

^b Maximum planar average.

^c Locations A, B, E in Figure B2-5.

Table B2-12g BWR Load Pattern Identifier Underload/Empty Location Key

Basket	Load Pattern Identifier	Evaluation Type ^a	Underload/Empty Basket Locations ^b
89	88	Uniform	45
	87	Uniform/Preferential	33, 57
	86	Uniform/Preferential	25, 43, 67
	85	Uniform/Preferential	25, 32, 58, 65
	84	Uniform	25, 32, 45, 58, 65
	83	Uniform	15, 31, 37, 45, 64, 76
	82	Uniform	14, 26, 31, 45, 59, 64, 76
81-DF	80	Uniform/Preferential	41
	79	Uniform/Preferential	29, 53
	78	Uniform/Preferential	28, 31, 62
	77	Uniform	20, 39, 43, 62
	76	Uniform	21, 28, 41, 54, 61
	75	Uniform	21, 28, 41, 50, 54, 62

a Analysis type that this load pattern is identified with.

b Locations identified in Figure B2-4 (BWR 89-Assembly) and Figure B2-5 (BWR-DF 81-Assembly).

Table B2-12h BWR CILC Fuel Assembly Enrichment Limits

Basket Configuration	89 Assembly	89 Assembly	81 Assembly DF
Load Definition	Full Load - 89 Assembly	Underload - 87 Assembly	Full Load - 81 Assembly
Assembly Type	Enrichment (wt% 235U) Maximum Planar Average		
B8_59A	3.3%	3.6%	3.4%
B8_60A	3.3%	3.6%	3.4%
B8_60B	3.3%	3.6%	3.3%
B8_61B	3.3%	3.6%	3.3%
B8_62A	3.2%	3.5%	3.3%
B8_63A	3.2%	3.5%	3.3%
B8_64A	3.2%	3.5%	3.3%
B8_64B	3.2%	3.5%	3.3%

Figure B2-4 Schematic of BWR 89-Assembly Basket

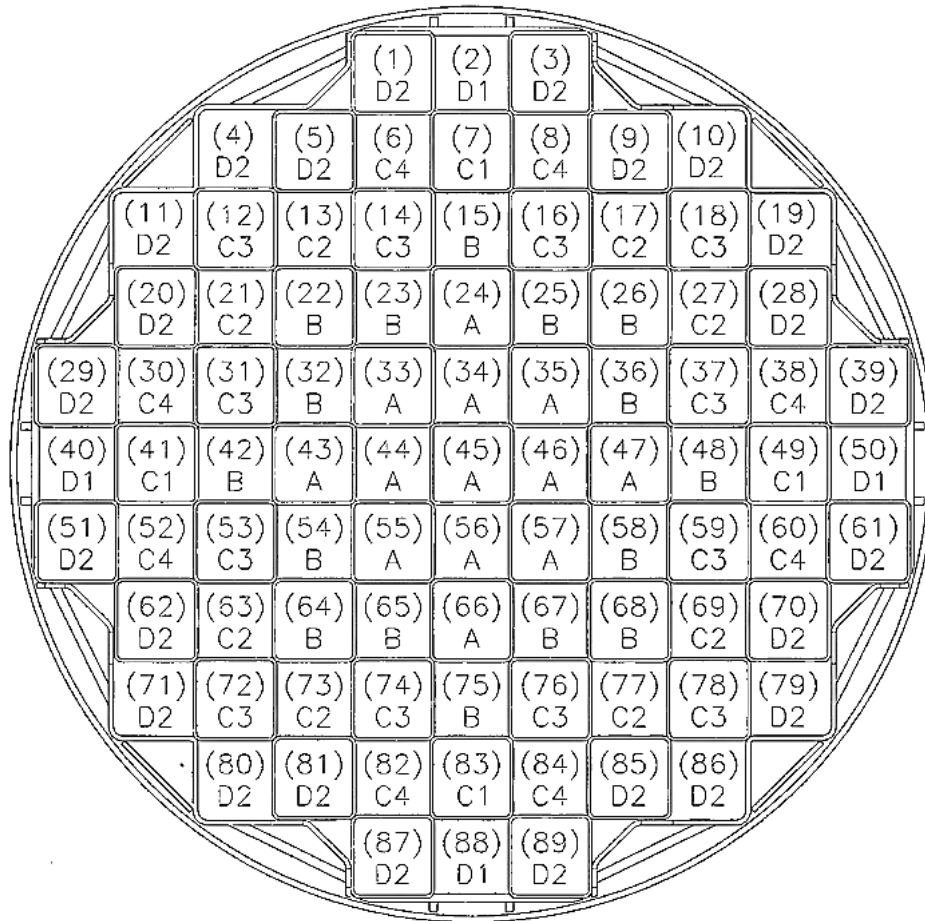


Figure B2-5 Schematic of BWR 81-Assembly Basket

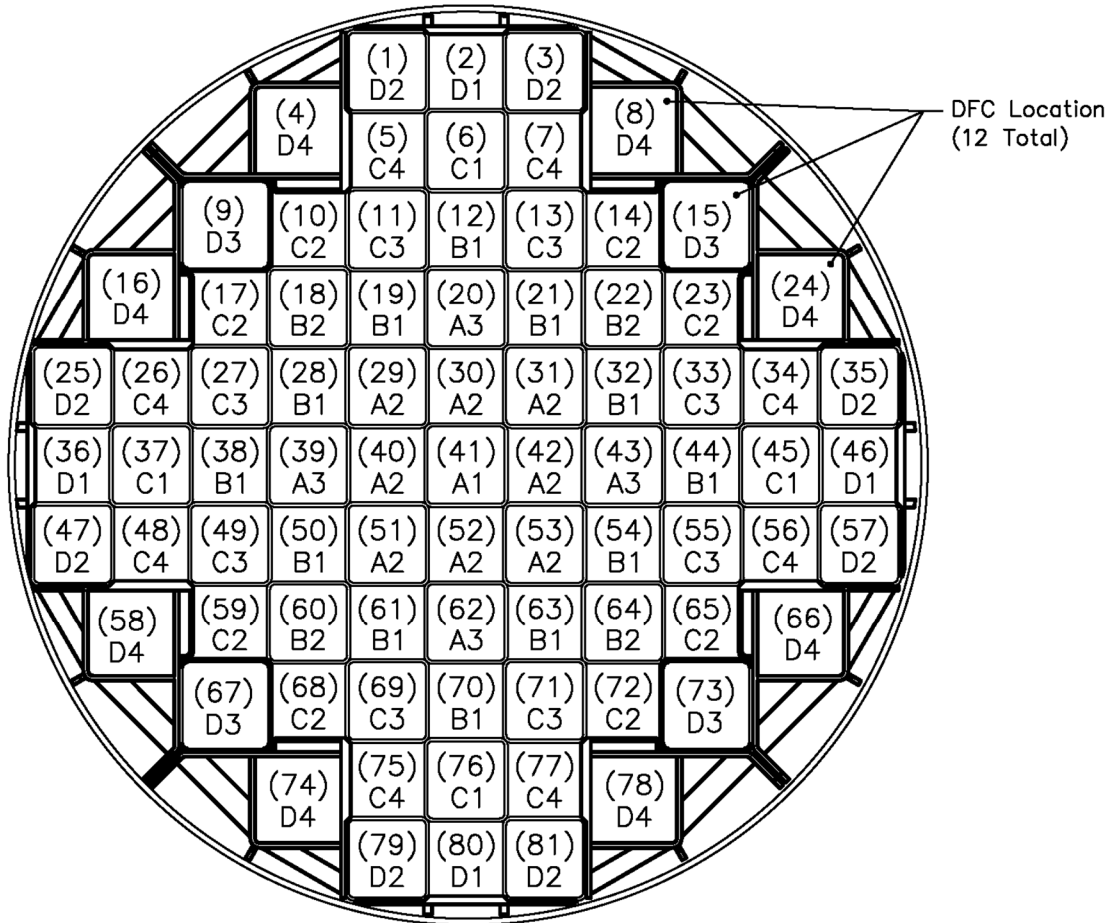
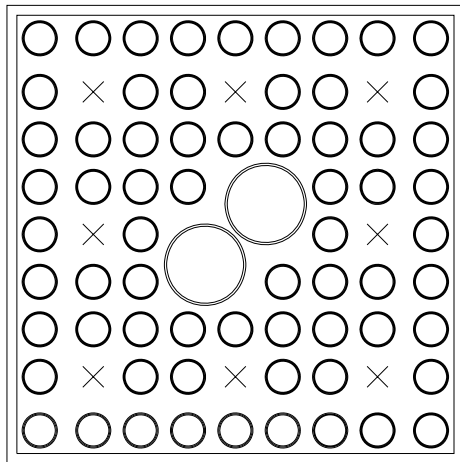
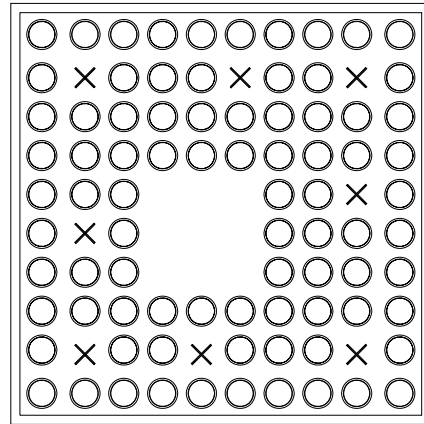


Figure B2-6 BWR Partial Length Fuel Rod Location Sketches



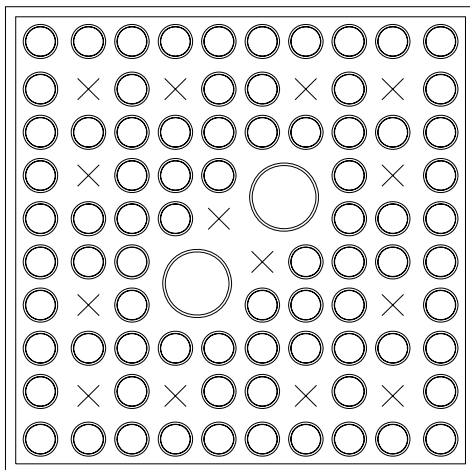
○ = Fuel Rod Location
× = Partial Rod Location

B9_74A 8 Partial Length Rods



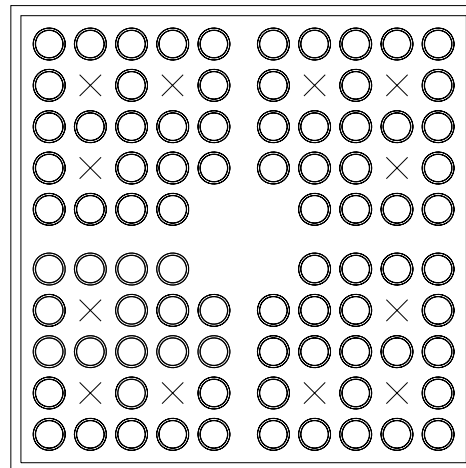
○ = Fuel Rod Location
× = Partial Rod Location

B10_91A 8 Partial Length Rods



○ = Fuel Rod Location
× = Partial Rod Location

B10_92A 14 Partial Length Rods



○ = Fuel Rod Location
× = Partial Rod Location

B10_96A 12 Partial Length Rods

Table B2-13 thru Table B2-43 [DELETED]

3.0 FUEL BEARING MATERIAL TO BE STORED IN THE MAGNASTOR SYSTEM

Fuel Bearing Material (FBM) is any component or pieces of components associated with Three Mile Island Unit 2 (TMI-2) reactor operations that have been contaminated by used (spent) nuclear fuel and or the associated isotopes in used (spent) nuclear fuel. The FBM is not capable of being separated between SNF and GTCC material, and the FBM contains fuel fragments with non-trivial quantities of SNF. Fission product contamination is included in the definition of FBM regardless of the location of the fission products (either associated with used fuel or has separated from used fuel within facilities via material volatility during and post reactor fuel melt). FBM may be associated with fuel assembly hardware components, non-fuel hardware (i.e., fuel assembly control components), or significantly activated non-fuel materials (e.g., reactor barrel) or be located away from the high activation region (e.g., heat exchangers). The FBM used fuel component may be present in forms ranging from thin coatings to chips and fines and up to larger adhered or loose debris. FBM may contain limited amount of non-metallic, non-spent fuel components (e.g., seals/wiring within pump or valves that have been contaminated). FBM may be collected in Stainless Steel filter housings which are directly loaded into the FBM TSC.

Table B3-1 TSC with FBM Limits

I. TSC with FBM

A. Allowable Contents

1. Fuel Bearing Material (FBM) is any component or pieces of components associated with Three Mile Island Unit 2 (TMI-2) reactor operations that have been contaminated by used (spent) nuclear fuel and or the associated isotopes in used (spent) nuclear fuel. The FBM is not capable of being separated between SNF and GTCC material, and the FBM contains fuel fragments with non-trivial quantities of SNF. Fission product contamination is included in the definition of FBM regardless of the location of the fission products (either associated with used fuel or has separated from used fuel within facilities via material volatility during and post reactor fuel melt). FBM may be associated with fuel assembly hardware components, non-fuel hardware (i.e., fuel assembly control components), or significantly activated non-fuel materials (e.g., reactor barrel) or be located away from the high activation region (e.g., heat exchangers). The FBM used fuel component may be present in forms ranging from thin coatings to chips and fines and up to larger adhered or loose debris. FBM may contain limited amount of non-metallic, non-spent fuel components (e.g., seals/wiring within pump or valves that have been contaminated). FBM may be collected in Stainless Steel filter housings which are directly loaded into the FBM TSC.

2. FBM Vessels

FBM Vessels fabricated from Stainless Steel, containing no liner, and sealed with mechanical closures containing used filter-media used to extract FBM are approved contents for loading into the MAGNASTOR FBM TSC provided that they have demonstrated to be free of moisture and hydrogen generating materials as described below prior to being sealed within the FBM TSC.

A. All vessels containing Zeolite/Apatite shall be:

- Dewatered and demonstrate dryness by maintaining at an internal pressure of no more than 3 torr for at least 30 minutes with the vacuum pump turned off with the suction valve closed, AND
- Upon completion of the dryness verification, the Vessel shall be backfilled with Ultra-High Purity Helium (minimum 99.999% helium) starting at no more than 3 torr and backfilled to 1 ATM (+1/-0 psig)

B. All vessels containing Solids Filter, AMFM Sacrificial Filter and Carbon shall:

- Demonstrate the removal of hydrogen producing material by undergoing the Vacuum Thermal Desorption (VTD). process to remove hydrogen producing organic material, AND
- Demonstrate dryness by maintaining at an internal pressure of no more than 3 torr for at least 30 minutes with the vacuum pump isolated and turned off and prior to initiating backfill of the Vessel, AND

Table B3-1 TSC with FBM Limits (continued)

- Upon completion of the dryness verification, the Vessel shall be backfilled with Ultra-High Purity Helium (minimum 99.999% helium) starting at no more than 3 torr and backfilled to 1 ATM (+1/-0 psig)

II. FBM TSC with Waste Basket Liner

A. Allowable Contents

1. FBM that meets the following specifications:

Table B3-2 FBM TSC with FBM Limits

Characteristic	Value
Maximum Heat Load	139W
Maximum Uranium Mass	840 kg
Maximum Payload Weight Within WBL ^a	76,599 lb
Maximum Curie Content ^b (characterization date 1/1/1990)	150,000 Ci

^a Payload weight includes FBM and dunnage. Dunnage includes, but is not limited to, the Segmented Tube Assembly (STA) and Debris Material Container (DMC) and any additional support (“furniture”) or containers used to facilitate loading operations.

^b Minimum 33 year cooled from characterization date. At characterization date inventory to be less than 47 kCi Cs-137 (41 kCi Ba-137m) and less than 25 kCi Co-60.