APPENDIX B

APPROVED CONTENTS AND DESIGN FEATURES FOR THE NAC-UMS® SYSTEM

AMENDMENT NO. 9

Appendix B
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1.0 [Reserved]

B 2.0 APPROVED CONTENTS

B 2.1 Fuel Specifications and Loading Conditions

The NAC-UMS® System is designed to provide passive dry storage of canistered PWR and BWR spent fuel. The system requires few operating controls. The principal controls and limits for the NAC-UMS® SYSTEM are satisfied by the selection of fuel for storage that meets the Approved Contents presented in this section and in Tables B2-1 through B2-5 for the standard NAC-UMS® SYSTEM design basis spent fuels.

This section also permits the loading of fuel assemblies that are unique to specific reactor sites. SITE SPECIFIC FUEL assembly configurations are either shown to be bounded by the analysis of the standard NAC-UMS® System design basis fuel assembly configuration of the same type (PWR or BWR), or are shown to be acceptable contents by specific evaluation of the configuration.

The separate specific evaluation may establish different limits, which are maintained by administrative controls for preferential loading. The preferential loading controls allow the loading of unique configurations as compared to the standard NAC-UMS® System design basis spent fuels.

Unless specifically excepted, SITE SPECIFIC FUEL must meet all of the controls and limits specified for the NAC-UMS® System.

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

- The affected fuel assemblies shall be placed in a safe condition.
- Within 24 hours, notify the NRC Operations Center.
- Within 60 days, submit a special report in accordance with the applicable requirements of 10 CFR 72.75(g).

(continued)

B 2.1.1 Fuel to be Stored in the NAC-UMS® SYSTEM

UNDAMAGED FUEL ASSEMBLIES meeting the limits specified in Tables B2-1 through B2-5 may be stored in the NAC-UMS® SYSTEM.

B 2.1.2 Maine Yankee SITE SPECIFIC FUEL Preferential Loading

The estimated Maine Yankee SITE SPECIFIC FUEL inventory is shown in Table B2-6. As shown in this table, certain of the Maine Yankee fuel configurations must be preferentially loaded in specific basket fuel tube positions.

Corner positions are used for CONSOLIDATED FUEL, certain HIGH BURNUP FUEL and DAMAGED FUEL or FUEL DEBRIS loaded in a MAINE YANKEE FUEL CAN, for fuel assemblies with missing fuel rods, burnable poison rods or fuel assemblies with fuel rods that have been replaced by hollow zirconium alloy rods. Designation for placement in corner positions results primarily from shielding or criticality evaluations of these fuel configurations. CONSOLIDATED FUEL is conservatively designated for a corner position, even though analysis shows that these lattices could be loaded in any basket position. Corner positions are positions 3, 6, 19, and 22 in Figure B2-1.

Preferential loading is also used for HIGH BURNUP FUEL not loaded in the MAINE YANKEE FUEL CAN. This fuel is assigned to peripheral locations, positions 1, 2, 3, 6, 7, 12, 13, 18, 19, 22, 23, and 24 in Figure B2-1. The interior locations, positions 4, 5, 8, 9, 10, 11, 14, 15, 16, 17, 20, and 21, must be loaded with fuel that has lower burnup and/or longer cool times to maintain the design basis heat load (23 kW per canister).

One of the two loading patterns (Standard or Preferential) shown in Table B2-8 must be used to load each canister. For the Standard loading pattern, the heat load of each fuel assembly is limited to 0.958 kW. For the Preferential loading pattern, the heat load of the fuel assemblies at the basket periphery locations is limited to 1.05 kW, and the heat load of the fuel assemblies at the basket interior locations is limited to 0.867 kW. Once selected, all of the spent fuel in that canister must be loaded in accordance with that pattern. Within a pattern, mixing of enrichment and cool time is allowed, but no mixing of loading patterns is permitted. Choosing a Preferential pattern restricts the interior fuel to the cool times shown in the Preferential (I) column, and the peripheral fuel to the cool times shown in the Preferential (P) column.

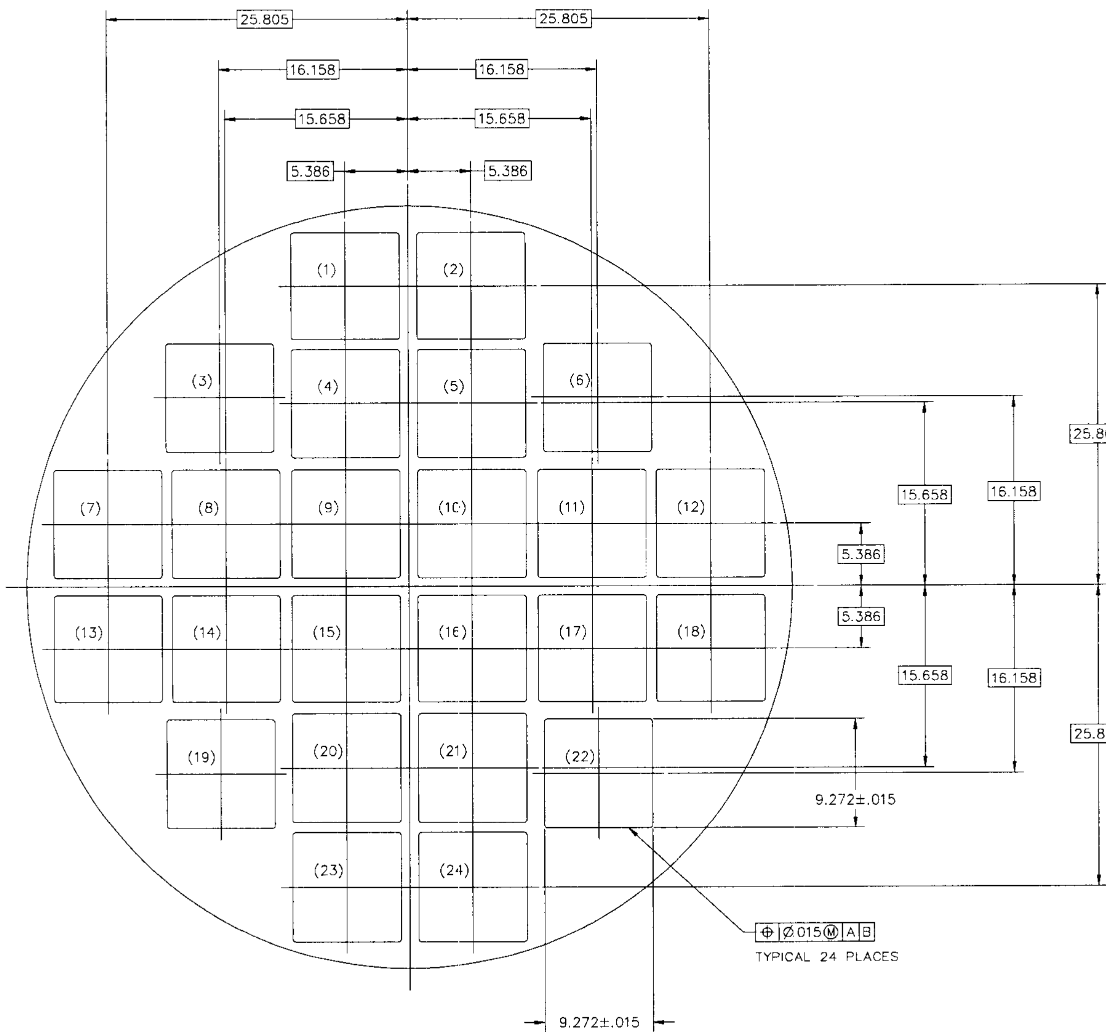
(continued)

B 2.1.2 Maine Yankee SITE SPECIFIC FUEL Preferential Loading (continued)

Fuel assemblies with a control element assembly (CEA) inserted will be loaded in a Class 2 canister and basket due to the increased length of the assembly with the CEA installed. However, these assemblies are not restricted as to loading position within the basket. Fuel assemblies with non-fuel items installed in corner guide tubes of the fuel assembly must also have a flow mixer installed and must be loaded in a basket corner fuel position in a Class 2 canister.

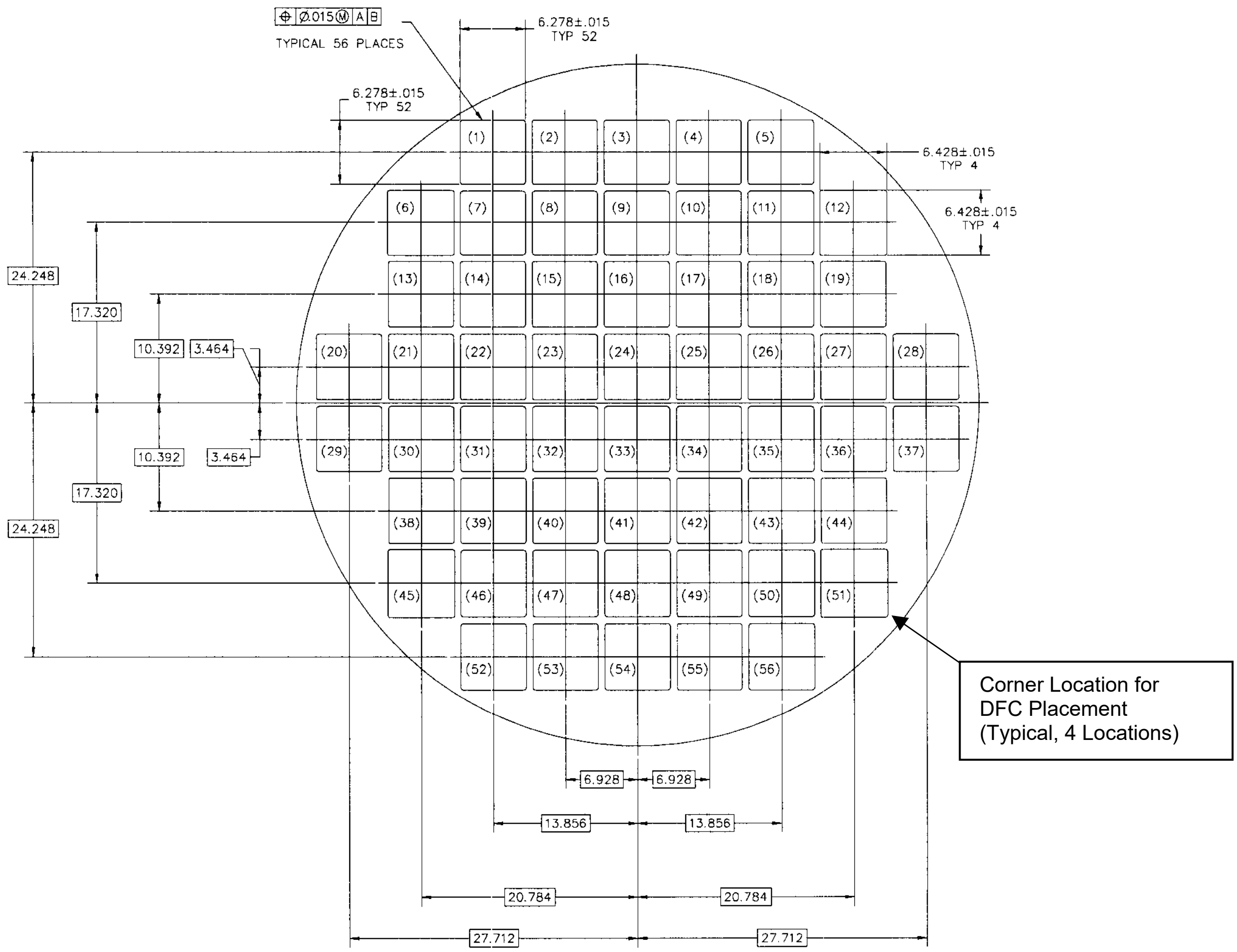
The Transportable Storage Canister loading procedures indicate that loading of a fuel configuration with removed fuel or poison rods, CONSOLIDATED FUEL, or a MAINE YANKEE FUEL CAN with DAMAGED FUEL, FUEL DEBRIS or HIGH BURNUP FUEL, is administratively controlled in accordance with Section B 2.1.

Figure B2-1 PWR Basket Fuel Loading Positions and Minimum Flux Trap Definition



Note: Variations in the dimensions due to fabrication error are permitted provided the minimum flux trap thickness specified in this figure is maintained and no more than two affected (out-of-tolerance) disk openings are adjacent to each other.

Figure B2-2 BWR Basket Fuel Loading Positions DFC Locations and Minimum Flux Trap Definition



Note: Variations in the dimensions due to fabrication error are permitted provided the minimum flux trap thickness specified in this figure is maintained and no more than two affected (out-of-tolerance) disk openings are adjacent to each other.

Figure B2-3 Preferential BWR Fuel Assembly Load Locations -Three Outer Location Possibilities for Higher Enrichment Fuel Assemblies

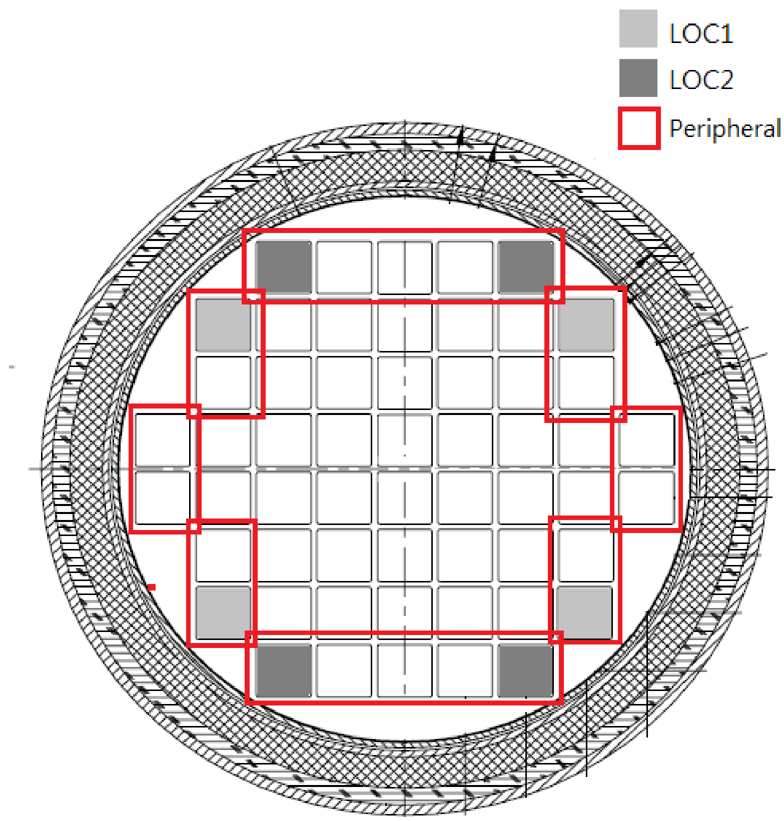


Table B2-1
Fuel Assembly Limits

I. NAC-UMS® CANISTER: PWR FUEL

A. Allowable Contents

1. Uranium oxide PWR UNDAMAGED FUEL ASSEMBLIES listed in Table B2-2 and meeting the following specifications:

a.	Cladding Type:	Zirconium alloy with thickness as specified in Table B2-2 for the applicable fuel assembly class.
b.	Enrichment, Post-irradiation Cooling Time and Average Burnup Per Assembly:	Maximum enrichment limits are shown in Table B2-2. For variable enrichment fuel assemblies, maximum enrichments represent peak rod enrichments. Combined minimum enrichment, maximum burnup and minimum cool time limits are shown in Table B2-4.
c.	Assembly Average Burnup:	Value calculated by averaging the burnup over the entire fuel region (UO_2) of an individual fuel assembly. The maximum assembly average burnup is 60,000 MWd/MTU.
d.	Peak Average Rod Burnup:	Value calculated by averaging the burnup in a rod over the length of the rod, then using the highest burnup calculated for any rod as the peak average rod burnup. The maximum peak average rod burnup is 62,500 MWd/MTU.
e.	Decay Heat Per Assembly:	$\leq$ 958.3 watts †
f.	Nominal Fresh Fuel Assembly Length (in.):	$\leq$ 178.3
g.	Nominal Fresh Fuel Assembly Width (in.):	$\leq$ 8.54
h.	Fuel Assembly Weight (lbs.):	$\leq$ 1,602 ‡

† Decay heat may be higher for site-specific configurations. A site-specific maximum decay heat of 1.05 kW is specified in Section B 2.1.2.

‡ Includes the weight of nonfuel-bearing components.

B. Quantity per CANISTER: Up to 24 PWR UNDAMAGED FUEL ASSEMBLIES.

C. PWR UNDAMAGED FUEL ASSEMBLIES may contain a flow mixer (thimble plug), an in-core instrument thimble, a burnable poison rod insert (Class 1 and Class 2 contents) consistent with Table B2-2, or solid stainless steel rods (inserted in the guide tubes).

D. PWR UNDAMAGED FUEL ASSEMBLIES shall not contain a control element assembly, except as permitted for SITE-SPECIFIC FUEL.

Table B2-1
Fuel Assembly Limits (continued)

E. Stainless steel spacers may be used in CANISTERS to axially position PWR UNDAMAGED FUEL ASSEMBLIES that are shorter than the available cavity length to facilitate handling.

F. Unenriched fuel assemblies are not authorized for loading.

G. The minimum length of the PWR UNDAMAGED FUEL ASSEMBLY internal structure and bottom end fitting and/or spacers shall ensure that the minimum distance to the fuel region from the base of the CANISTER is 3.2 inches.

H. PWR UNDAMAGED FUEL ASSEMBLIES with one or more grid spacers missing or damaged such that the unsupported length of the fuel rods does not exceed 60 inches. End fitting damage including damaged or missing hold-down springs is allowed, as long as the assembly can be handled safely by normal means.

I. PWR UNDAMAGED FUEL ASSEMBLIES not containing the nominal number of fuel rods specified in Table B2-2 must contain solid filler rods that displace a volume equal to, or greater than, that of the fuel rod that the filler rod replaces. SITE-SPECIFIC FUEL may contain missing fuel rods or hollow rods without replacement by solid filler rods provided the loading restrictions listed in Table B2-7 are met.

II. NAC-UMS® CANISTER: BWR FUEL

A. Allowable Contents

1. Uranium oxide BWR UNDAMAGED and DAMAGED FUEL ASSEMBLIES listed in Table B2-3 and meeting the following specifications:

a. Cladding Type:	Zirconium alloy with thickness as specified in Table B2-3 for the applicable fuel assembly class.
b. Enrichment:	Maximum INITIAL PEAK PLANAR-AVERAGE ENRICHMENTS are shown in Table B2-3 and Table B2-13 through B2-15. Combined minimum enrichment, maximum burnup and minimum cool time limits are shown in Table B2-5, and Tables B2-10 through B2-12.
c. Decay Heat per Assembly:	$\leq$ 410.7 watts
d. Post-irradiation Cooling Time and Average Burnup Per Assembly:	As specified in Table B2-5, and Tables B2-10 through B2-12 for the applicable fuel assembly class.

Table B2-1
Fuel Assembly Limits (continued)

e. Nominal Fresh Fuel Design Assembly Length (in.):	≤ 176.1
f. Nominal Fresh Fuel Design Assembly Width (in.):	≤ 5.51
g. Fuel Assembly Weight (lbs):	≤ 702, including channels

B. Quantity per CANISTER: Up to 56 BWR UNDAMAGED FUEL ASSEMBLIES. When loading DAMAGED FUEL up to four damaged fuel assemblies may be loaded.

C. BWR FUEL ASSEMBLIES can be unchanneled or channeled with zirconium alloy channels.

D. BWR FUEL ASSEMBLIES with stainless steel channels shall not be loaded.

E. Stainless steel fuel spacers may be used in CANISTERS to axially position BWR FUEL ASSEMBLIES that are shorter than the available cavity length to facilitate handling.

F. Unenriched fuel assemblies are not authorized for loading, except for the low burnup fuel assemblies identified when applying the criteria in Table B2-12 for the assembly types authorized by Table B2-3.

G. The minimum length of the BWR UNDAMAGED FUEL ASSEMBLY internal structure and bottom end fitting and/or spacers shall ensure that the minimum distance to the fuel region from the base of the CANISTER is 6.2 inches.

H. BWR UNDAMAGED FUEL ASSEMBLIES 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. BWR DAMAGED FUEL ASSEMBLIES may contain less than the nominal number of fuel rods specified in Table B2-3 without filler rods.

Table B2-2 PWR Fuel Assembly Characteristics

Fuel Class	Vendor[1]	Array	Max. MTU	W/O Boron Max. wt % ^{235}U[3]	With Boron Max. wt % ^{235}U[4]	No. of Fuel Rods	No. of Water Holes	Max. Pitch (in)	Min. Rod Dia. (in)	Min. Clad Thick (in)	Max. Pellet Dia.(in)	Max. Active Length (in)	Min. Guide Tube Thick (in)
1	CE	14×14	0.404	4.7	5.0	176	5	0.590	0.438	0.024	0.380	137.0	0.034
1	Ex/ANF	14×14	0.369	5.0	5.0	179	17	0.556	0.424	0.030	0.351	142.0	0.034
1	WE	14×14	0.362	5.0	5.0	179	17	0.556	0.400	0.024	0.345	144.0	0.034
1	WE	14×14	0.415	5.0	5.0	179	17	0.556	0.422	0.022	0.368	145.2	0.034
1	WE, Ex/ANF	15×15	0.465	4.4	5.0	204	21	0.563	0.422	0.024	0.366	144.0	0.015
1	Ex/ANF	17×17	0.413	4.4	5.0	264	25	0.496	0.360	0.025	0.303	144.0	0.016
1	WE	17×17	0.468	4.5	5.0	264	25	0.496	0.374	0.022	0.323	144.0	0.015
1	WE	17×17	0.429	4.3	5.0	264	25	0.496	0.360	0.022	0.309	144.0	0.015
2	B&W	15×15	0.481	4.4	5.0	208	17	0.568	0.430	0.026	0.369	144.0	0.016
2	B&W	17×17	0.466	4.4	5.0	264	25	0.502	0.379	0.024	0.324	143.0	0.017
3	CE	16×16	0.442	4.8	5.0	236	5	0.506	0.382	0.023	0.3255	150.0	0.035
1	Ex/ANF[2]	14×14	0.375	5.0	- -	179	17	0.556	0.417	0.030	0.351	144.0	0.036
1	CE[2]	15×15	0.432	4.2	- -	216	9[5]	0.550	0.418	0.026	0.358	132.0	----
1	Ex/ANF[2]	15×15	0.431	4.2	- -	216	9[5]	0.550	0.417	0.030	0.358	131.8	----
1	CE[2]	16×16	0.403	4.8	- -	236	5	0.506	0.382	0.023	0.3255	136.7	0.035

Note: Parameters shown are nominal pre-irradiation values.

1. Vendor ID indicates the source of assembly base parameters, which are nominal, pre-irradiation values. Loading of assemblies meeting above limits is not restricted to the vendor(s) listed.
2. 14×14, 15×15 and 16×16 fuel manufactured for Prairie Island, Palisades and St. Lucie 2 cores, respectively. These are not generic fuel assemblies provided to multiple reactors.
3. Maximum initial enrichment without boron credit. Assemblies meeting this limit may contain a flow mixer (thimble plug), an ICI thimble, a burnable poison rod insert, or solid stainless steel rods (inserted in guide tubes).
4. Maximum initial enrichment with credit for a minimum soluble boron concentration of 1000 ppm in the spent fuel pool water. Assemblies meeting this limit may contain a flow mixer (thimble plug).
5. Nine nonfuel locations, which may be filled by solid nonfuel rods.

Table B2-3 BWR Fuel Assembly Characteristics

Fuel Class[1]	Vendor[4]	Array	Fuel Identifier	Max. MTU	Max. wt % ^{235}U	No. of Fuel Rods	Max. Pitch (in)	Min. Rod Dia. (in)	Min. Clad Thick (in)	Max. Pellet Dia.(in)	Max. Active Length (in)[2]
4	Ex/ANF	7 × 7	--	0.196	4.5	48	0.738	0.570	0.036	0.490	144.0
4	Ex/ANF	8 × 8	--	0.177	4.7	63	0.641	0.484	0.036	0.405	145.2
4	Ex/ANF	9 × 9	--	0.173	4.4	79	0.572	0.424	0.030	0.357	145.2
4	GE	7 × 7	--	0.199	4.5	49	0.738	0.570	0.036	0.488	144.0
4	GE	7 × 7	--	0.198	4.5	49	0.738	0.563	0.032	0.487	144.0
4	GE	8 × 8	--	0.173	4.5	60	0.640	0.484	0.032	0.410	145.2
4	GE	8 × 8	--	0.179	4.5	62	0.640	0.483	0.032	0.410	145.2
4	GE	8 × 8	--	0.186	4.7	63	0.640	0.493	0.034	0.416	144.0
5	Ex/ANF	8 × 8	ex08b[6]	0.1845	Note 5	62	0.641	0.484	0.035	0.4055	150.0
5	Ex/ANF	9 × 9	--	0.167	4.4	74[3]	0.572	0.424	0.030	0.357	150.0
5	Ex/ANF	9 × 9	ex09c[6]	0.1817	Note 5	79	0.572	0.424	0.030	0.357	150.0
5	GE	7 × 7	--	0.193	4.7	49	0.738	0.563	0.037	0.477	146.0
5	GE	7 × 7	--	0.198	4.5	49	0.738	0.563	0.032	0.487	144.0
5	GE	8 × 8	ge08i[6]	0.1825	Note 5	60	0.640	0.483	0.032	0.410	150.0
5	GE	8 × 8	ge08k[6]	0.1886	Note 5	62	0.640	0.483	0.032	0.410	150.0
5	GE	8 × 8	ge08n[6]	0.192	Note 5	63	0.640	0.493	0.034	0.416	146.0
5	GE	9 × 9	--	0.186	4.5	74[3]	0.566	0.441	0.028	0.376	150.0
5	GE	9 × 9	--	0.198	4.6	79[3]	0.566	0.441	0.028	0.376	150.0
5	--	9 x 9	B9_72A[6]	0.1803	Note 5	72	0.572	0.433	0.026	0.374	150.0.
5	--	10 x 10	B10_91A[6]	0.1906	Note 5	91[3]	0.51	0.3957	0.02385	0.342	150.0.
5	--	10 x10	B10_92A[6]	0.1966	Note 5	92[3]	0.51	0.404	0.026	0.3455	150.0

Note: Parameters shown are nominal pre-irradiation values.
1. All fuel rods are zirconium alloy clad.
2. 150-inch active fuel length assemblies contain 6” natural uranium blankets on top and bottom.
3. Shortened active fuel length in some rods.
4. Vendor ID indicates the source of assembly base parameters, which are nominal, pre-irradiation values. Loading of assemblies meeting above limits is not restricted to the vendor(s) listed.
5. Maximum allowed enrichments vary depending on whether the fuel assemblies are loaded as undamaged with a uniform loading; in a damaged configuration; or are preferentially loaded. See Tables B2-9 through B2-11.
6. Fuel assemblies of these types are allowed a maximum assembly average burnup of 60 GWd/MTU (see Table B2-4, below) and may be loaded as UNDAMAGED or DAMAGED FUEL. Other fuel assembly types that are limited to 45 GWd/MTU and must be UNDAMAGED.

Table B2-4 Minimum Cooling Time Versus Burnup/Initial Enrichment for PWR Fuel

Minimum Initial Enrichment	**Assembly Average Burnup ≤30 GWd/MTU Minimum Cooling Time [years]**				**30< Assembly Average Burnup ≤35 GWd/MTU Minimum Cooling Time [years]**			
wt % ^{235}U (E)	**14×14**	**15×15**	**16×16**	**17×17**	**14×14**	**15×15**	**16×16**	**17×17**
1.9 ≤ E < 2.1	5	5	5	5	7	7	5	7
2.1 ≤ E < 2.3	5	5	5	5	7	6	5	6
2.3 ≤ E < 2.5	5	5	5	5	6	6	5	6
2.5 ≤ E < 2.7	5	5	5	5	6	6	5	6
2.7 ≤ E < 2.9	5	5	5	5	6	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5	5	5	5
3.7 ≤ E < 3.9	5	5	5	5	5	5	5	5
3.9 ≤ E < 4.1	5	5	5	5	5	5	5	5
4.1 ≤ E < 4.3	5	5	5	5	5	5	5	5
4.3 ≤ E < 4.5	5	5	5	5	5	5	5	5
4.5 ≤ E < 4.7	5	5	5	5	5	5	5	5
4.7 ≤ E < 4.9	5	5	5	5	5	5	5	5
E ≥ 4.9	5	5	5	5	5	5	5	5
Minimum Initial Enrichment	**35< Assembly Average Burnup ≤40 GWd/MTU Minimum Cooling Time [years]**				**40< Assembly Average Burnup ≤45 GWd/MTU Minimum Cooling Time [years]**			
wt % ^{235}U (E)	**14×14**	**15×15**	**16×16**	**17×17**	**14×14**	**15×15**	**16×16**	**17×17**
1.9 ≤ E < 2.1	10	10	7	10	15	15	11	15
2.1 ≤ E < 2.3	9	9	6	9	14	13	9	13
2.3 ≤ E < 2.5	8	8	6	8	12	12	8	12
2.5 ≤ E < 2.7	8	7	6	7	11	11	7	11
2.7 ≤ E < 2.9	7	7	6	7	10	10	7	10
2.9 ≤ E < 3.1	7	6	6	7	9	9	7	9
3.1 ≤ E < 3.3	6	6	6	6	9	8	7	8
3.3 ≤ E < 3.5	6	6	6	6	8	8	7	8
3.5 ≤ E < 3.7	6	6	6	6	7	8	7	7
3.7 ≤ E < 3.9	6	6	6	6	7	8	7	7
3.9 ≤ E < 4.1	6	6	6	6	7	7	7	7
4.1 ≤ E < 4.3	5	6	6	6	6	7	7	7
4.3 ≤ E < 4.5	5	6	6	6	6	7	7	7
4.5 ≤ E < 4.7	5	6	5	6	6	7	6	7
4.7 ≤ E < 4.9	5	6	5	6	6	7	6	7
E ≥ 4.9	5	6	5	6	6	7	6	7

Table B2-4 Minimum Cooling Time Versus Burnup/Initial Enrichment for PWR Fuel (continued)

Minimum Initial Enrichment	**45< Assembly Average Burnup ≤50 GWd/MTU Minimum Cooling Time [years]**				**50< Assembly Average Burnup ≤55 GWd/MTU Minimum Cooling Time [years]**			
wt % ^{235}U (E)	**14×14**	**15×15**	**16×16**	**17×17**	**14×14**	**15×15**	**16×16**	**17×17**
1.9 ≤ E < 2.1	21	21	18	21	27	27	25	27
2.1 ≤ E < 2.3	19	19	16	19	25	25	23	25
2.3 ≤ E < 2.5	17	17	14	17	23	24	21	24
2.5 ≤ E < 2.7	16	16	12	16	21	22	19	22
2.7 ≤ E < 2.9	14	14	11	14	20	20	17	20
2.9 ≤ E < 3.1	13	13	9	13	18	18	15	18
3.1 ≤ E < 3.3	12	12	9	12	17	17	13	17
3.3 ≤ E < 3.5	11	11	9	11	15	15	12	15
3.5 ≤ E < 3.7	10	10	8	10	14	14	11	14
3.7 ≤ E < 3.9	9	10	8	9	13	13	11	13
3.9 ≤ E < 4.1	9	10	8	9	12	13	11	12
4.1 ≤ E < 4.3	8	10	8	9	11	13	10	12
4.3 ≤ E < 4.5	8	9	8	9	10	13	10	12
4.5 ≤ E < 4.7	7	9	8	9	10	12	10	12
4.7 ≤ E < 4.9	7	9	8	9	9	12	10	12
E ≥ 4.9	7	9	8	9	9	12	10	11
Minimum Initial Enrichment	**55< Assembly Average Burnup ≤60 GWd/MTU Minimum Cooling Time [years]**							
wt % ^{235}U (E)	**14×14**	**15×15**	**16×16**	**17×17**				
1.9 ≤ E < 2.1	33	34	32	34				
2.1 ≤ E < 2.3	31	32	30	32				
2.3 ≤ E < 2.5	29	30	28	30				
2.5 ≤ E < 2.7	28	28	26	28				
2.7 ≤ E < 2.9	26	26	24	26				
2.9 ≤ E < 3.1	24	24	22	24				
3.1 ≤ E < 3.3	22	23	20	23				
3.3 ≤ E < 3.5	21	21	18	21				
3.5 ≤ E < 3.7	19	19	17	20				
3.7 ≤ E < 3.9	18	18	15	18				
3.9 ≤ E < 4.1	17	18	14	17				
4.1 ≤ E < 4.3	15	17	14	16				
4.3 ≤ E < 4.5	14	17	14	16				
4.5 ≤ E < 4.7	13	17	14	16				
4.7 ≤ E < 4.9	12	17	13	16				
E ≥ 4.9	12	16	13	15				

Table B2-5 Minimum Cooling Time Versus Burnup/Initial Enrichment for BWR Fuel

Minimum Initial Enrichment wt % ^{235}U (E)	**Assembly Average Burnup ≤30 GWd/MTU Minimum Cooling Time [years]**			**30< Assembly Average Burnup ≤35 GWd/MTU Minimum Cooling Time [years]**		
	7×7	**8×8**	**9×9**	**7×7**	**8×8**	**9×9**
1.9 ≤ E < 2.1	5	5	5	8	7	7
2.1 ≤ E < 2.3	5	5	5	6	6	6
2.3 ≤ E < 2.5	5	5	5	6	5	6
2.5 ≤ E < 2.7	5	5	5	5	5	5
2.7 ≤ E < 2.9	5	5	5	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5	5
3.7 ≤ E < 3.9	5	5	5	5	5	5
3.9 ≤ E < 4.1	5	5	5	5	5	5
4.1 ≤ E < 4.3	5	5	5	5	5	5
4.3 ≤ E < 4.5	5	5	5	5	5	5
4.5 ≤ E ≤ 4.7	5	5	5	5	5	5
Minimum Initial Enrichment wt % ^{235}U (E)	**35< Assembly Average Burnup ≤40 GWd/MTU Minimum Cooling Time [years]**			**40< Assembly Average Burnup ≤45 GWd/MTU Minimum Cooling Time [years]**		
	7×7	**8×8**	**9×9**	**7×7**	**8×8**	**9×9**
1.9 ≤ E < 2.1	16	14	15	26	24	25
2.1 ≤ E < 2.3	13	12	12	23	21	22
2.3 ≤ E < 2.5	11	9	10	20	18	19
2.5 ≤ E < 2.7	9	8	8	18	16	17
2.7 ≤ E < 2.9	8	7	7	15	13	14
2.9 ≤ E < 3.1	7	6	6	13	11	12
3.1 ≤ E < 3.3	6	6	6	11	10	10
3.3 ≤ E < 3.5	6	5	6	9	8	9
3.5 ≤ E < 3.7	6	5	6	8	7	7
3.7 ≤ E < 3.9	6	5	5	7	6	7
3.9 ≤ E < 4.1	5	5	5	7	6	7
4.1 ≤ E < 4.3	5	5	5	7	6	6
4.3 ≤ E < 4.5	5	5	5	6	6	6
4.5 ≤ E ≤ 4.7	5	5	5	6	6	6

Table B2-6 Maine Yankee Site Specific Fuel Canister Loading Position Summary

Site Specific Spent Fuel Configurations[1]	**Est. Number of Assemblies**[2]	**Canister Loading Position**
Total Number of Fuel Assemblies[3]	1,434	Any
Inserted Control Element Assembly (CEA)	168	Any
Inserted In-Core Instrument (ICI) Thimble	138	Any
Consolidated Fuel	2	Corner[4]
Fuel Rod Replaced by Rod Enriched to 1.95 wt %	3	Any
Fuel Rod Replaced by Stainless Steel Rod or Zirconium Alloy Rod	18	Any
Fuel Rods Removed	10	Corner[4]
Variable Enrichment[6]	72	Any
Variable Enrichment and Axial Blanket[6]	68	Any
Burnable Poison Rod Replaced by Hollow Zirconium Alloy Rod	80	Corner[4]
Damaged Fuel in MAINE YANKEE FUEL CAN	12	Corner[4]
Burnup between 45,000 and 50,000 MWD/MTU	90	Periphery[5]
MAINE YANKEE FUEL CAN	As Required	Corner[4]
Inserted Start-up Source	4	Corner[4]
Inserted CEA Finger Tip or ICI String Segment	1	Corner[4]

1. All spent fuel, including that held in a Maine Yankee fuel can, must conform to the loading limits presented in Tables B2-8 and B2-9 for cool time.
2. The number of fuel assemblies in some categories may vary depending on future fuel inspections.
3. Includes these site specific spent fuel configurations and standard fuel assemblies. Standard fuel assemblies may be loaded in any canister position.
4. Basket corner positions are positions 3, 6, 19, and 22 in Figure B2-1. Corner positions are also periphery positions.
5. Basket periphery positions are positions 1, 2, 3, 6, 7, 12, 13, 18, 19, 22, 23, and 24 in Figure B2-1. Periphery positions include the corner positions.
6. Variably enriched fuel assemblies have a maximum burnup of less than 30,000 MWD/MTU and enrichments greater than 1.9 wt %. The minimum required cool time for these assemblies is 5 years.

Table B2-7 Maine Yankee Site Specific Fuel Limits

A. Allowable Contents
   1. Combustion Engineering 14 × 14 PWR UNDAMAGED FUEL ASSEMBLIES meeting the specifications presented in Tables B2-1, B2-2 and B2-4.
   2. PWR UNDAMAGED FUEL ASSEMBLIES may contain inserted Control Element Assemblies (CEA), In-Core Instrument (ICI) Thimbles or Flow Mixers. CEAs or Flow Mixers may not be inserted in damaged fuel assemblies, consolidated fuel assemblies or assemblies with irradiated stainless steel replacement rods. Fuel assemblies with a CEA or Flow Mixer inserted must be loaded in a Class 2 CANISTER and cannot be loaded in a Class 1 CANISTER. Fuel assemblies without an inserted CEA or CEA Plug, including those with inserted ICI Thimbles, must be loaded in a Class 1 CANISTER.
   3. PWR UNDAMAGED FUEL ASSEMBLIES with fuel rods replaced with stainless steel or zirconium alloy rods or with uranium oxide rods nominally enriched up to 1.95 wt %.
   4. PWR UNDAMAGED FUEL ASSEMBLIES with fuel rods having variable enrichments with a maximum fuel rod enrichment up to 4.21 wt % ^{235}U and that also have a maximum planar average enrichment up to 3.99 wt % ^{235}U.
   5. PWR UNDAMAGED FUEL ASSEMBLIES with annular axial end blankets. The axial end blanket enrichment may be up to 2.6 wt % ^{235}U.
   6. PWR UNDAMAGED FUEL ASSEMBLIES with solid filler rods or burnable poison rods occupying up to 16 of 176 fuel rod positions.
   7. PWR UNDAMAGED FUEL ASSEMBLIES with one or more grid spacers missing or damaged such that the unsupported length of the fuel rods does not exceed 60 inches or with end fitting damage, including damaged or missing hold-down springs, as long as the assembly can be handled safely by normal means.

B. Allowable Contents requiring preferential loading based on shielding, criticality or thermal constraints. The preferential loading requirement for these fuel configurations is as described in Table B2-6.
   1. PWR UNDAMAGED FUEL ASSEMBLIES with up to 176 fuel rods missing from the fuel assembly lattice.
   2. PWR UNDAMAGED FUEL ASSEMBLIES with a burnup between 45,000 and 50,000 MWd/MTU that must be loaded in accordance with Tables B2-6 and B2-8.
   3. PWR UNDAMAGED FUEL ASSEMBLIES with a burnable poison rod replaced by a hollow zirconium alloy rod.

Table B2-7 Maine Yankee Site Specific Fuel Limits (continued)

4. UNDAMAGED FUEL ASSEMBLIES with a start-up source in a center guide tube. The assembly must be loaded in a basket corner position and must be loaded in a Class 1 CANISTER. Only one (1) start-up source may be loaded in any fuel assembly or any CANISTER.
5. PWR UNDAMAGED FUEL ASSEMBLIES with CEA ends (finger tips) and/or ICI segment inserted in corner guide tube positions. The assembly must also have a CEA plug installed. The assembly must be loaded in a basket corner position and must be loaded in a Class 2 CANISTER.
6. UNDAMAGED FUEL ASSEMBLIES may be loaded in a MAINE YANKEE FUEL CAN.
7. FUEL enclosed in a MAINE YANKEE FUEL CAN. The MAINE YANKEE FUEL CAN can only be loaded in a Class 1 CANISTER. The contents that must be loaded in the MAINE YANKEE FUEL CAN are:

   a) PWR fuel assemblies with up to two UNDAMAGED or DAMAGED FUEL rods inserted in each fuel assembly guide tube or with up to two burnable poison rods inserted in each guide tube. The rods inserted in the guide tubes cannot be from a different fuel assembly. The maximum number of rods in the fuel assembly (fuel rods plus inserted rods, including burnable poison rods) is 176.

   b) A DAMAGED FUEL ASSEMBLY with up to 100% of the fuel rods classified as damaged and/or damaged or missing assembly hardware components. A DAMAGED FUEL ASSEMBLY cannot have an inserted CEA or other nonfuel component.

   c) Individual UNDAMAGED or DAMAGED FUEL rods in a rod type structure, which may be a guide tube, to maintain configuration control.

   d) FUEL DEBRIS consisting of fuel rods with exposed fuel pellets or individual intact or partial fuel pellets not contained in fuel rods.

Table B2-7 Maine Yankee Site Specific Fuel Limits (continued)

e) CONSOLIDATED FUEL lattice structure with a 17 × 17 array formed by grids and top and bottom end fittings connected by four solid stainless steel rods. Maximum contents are 289 fuel rods having a total lattice weight ≤ 2,100 pounds. A CONSOLIDATED FUEL lattice cannot have an inserted CEA or other nonfuel component. Only one CONSOLIDATED FUEL lattice may be stored in any CANISTER.

C. Unenriched fuel assemblies are not authorized for loading.

D. A canister preferentially loaded in accordance with Table B2-8 may only contain fuel assemblies selected from the same loading pattern.

Table B2-8 Loading Table for Maine Yankee CE 14 × 14 Fuel with No Non-Fuel Material – Required Cool Time in Years Before Assembly is Acceptable

	Burnup ≤ 30 GWD/MTU - Minimum Cool Time [years] for		
Enrichment	**Standard[1]**	**Preferential (I)[2]**	**Preferential (P)[3]**
1.9 ≤ E < 2.1	5	5	5
2.1 ≤ E < 2.3	5	5	5
2.3 ≤ E < 2.5	5	5	5
2.5 ≤ E < 2.7	5	5	5
2.7 ≤ E < 2.9	5	5	5
2.9 ≤ E < 3.1	5	5	5
3.1 ≤ E < 3.3	5	5	5
3.3 ≤ E < 3.5	5	5	5
3.5 ≤ E < 3.7	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5
	30 < Burnup ≤ 35 GWD/MTU - Minimum Cool Time [years] for		
Enrichment	**Standard[1]**	**Preferential (I)[2]**	**Preferential (P)[3]**
1.9 ≤ E < 2.1	5	5	5
2.1 ≤ E < 2.3	5	5	5
2.3 ≤ E < 2.5	5	5	5
2.5 ≤ E < 2.7	5	5	5
2.7 ≤ E < 2.9	5	5	5
2.9 ≤ E < 3.1	5	5	5
3.1 ≤ E < 3.3	5	5	5
3.3 ≤ E < 3.5	5	5	5
3.5 ≤ E < 3.7	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5
	35 < Burnup ≤ 40 GWD/MTU - Minimum Cool Time [years] for		
Enrichment	**Standard[1]**	**Preferential (I)[2]**	**Preferential (P)[3]**
1.9 ≤ E < 2.1	7	7	5
2.1 ≤ E < 2.3	6	6	5
2.3 ≤ E < 2.5	6	6	5
2.5 ≤ E < 2.7	5	6	5
2.7 ≤ E < 2.9	5	6	5
2.9 ≤ E < 3.1	5	6	5
3.1 ≤ E < 3.3	5	6	5
3.3 ≤ E < 3.5	5	6	5
3.5 ≤ E < 3.7	5	6	5
3.7 ≤ E ≤ 4.2	5	6	5

1. “Standard” loading pattern: allowable decay heat = 0.958 kW per assembly
2. “Preferential” loading pattern, interior basket locations: allowable heat decay = 0.867 kW per assembly
3. “Preferential” loading pattern, periphery basket locations: allowable heat decay = 1.05 kW per assembly

Table B2-8 Loading Table for Maine Yankee CE 14 × 14 Fuel with No Non-Fuel Material – Required Cool Time in Years Before Assembly is Acceptable (Continued)

	40 < Burnup ≤ 45 GWD/MTU - Minimum Cool Time [years] for		
Enrichment	**Standard[1]**	**Preferential (I)[2]**	**Preferential (P)[3]**
1.9 ≤ E < 2.1	11	11	6
2.1 ≤ E < 2.3	9	9	6
2.3 ≤ E < 2.5	8	8	6
2.5 ≤ E < 2.7	7	7	6
2.7 ≤ E < 2.9	7	7	6
2.9 ≤ E < 3.1	6	7	6
3.1 ≤ E < 3.3	6	7	5
3.3 ≤ E < 3.5	6	7	5
3.5 ≤ E < 3.7	6	7	5
3.7 ≤ E ≤ 4.2	6	7	5
	45 < Burnup ≤ 50 GWD/MTU - Minimum Cool Time [years] for		
Enrichment	Standard[1]	**Preferential (I)[2]**	**Preferential (P)[3]**
1.9 ≤ E < 2.1	Not allowed	Not allowed	7
2.1 ≤ E < 2.3	Not allowed	Not allowed	7
2.3 ≤ E < 2.5	Not allowed	Not allowed	7
2.5 ≤ E < 2.7	Not allowed	Not allowed	7
2.7 ≤ E < 2.9	Not allowed	Not allowed	7
2.9 ≤ E < 3.1	Not allowed	Not allowed	7
3.1 ≤ E < 3.3	Not allowed	Not allowed	7
3.3 ≤ E < 3.5	Not allowed	Not allowed	6
3.5 ≤ E < 3.7	Not allowed	Not allowed	6
3.7 ≤ E ≤ 4.2	Not allowed	Not allowed	6

1. “Standard” loading pattern: allowable decay heat = 0.958 kW per assembly
2. “Preferential” loading pattern, interior basket locations: allowable heat decay = 0.867 kW per assembly
3. “Preferential” loading pattern, periphery basket locations: allowable heat decay = 1.05 kW per assembly

Table B2-9 Loading Table for Maine Yankee CE 14 × 14 Fuel Containing CEA Cooled to Indicated Time

Enrichment	≤ 30 GWD/MTU Burnup - Minimum Cool Time in Years for				
	No CEA (Class 2)	5 Year CEA	10 Year CEA	15 Year CEA	20 Year CEA
1.9 ≤ E < 2.1	5	5	5	5	5
2.1 ≤ E < 2.3	5	5	5	5	5
2.3 ≤ E < 2.5	5	5	5	5	5
2.5 ≤ E < 2.7	5	5	5	5	5
2.7 ≤ E < 2.9	5	5	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5	5	5
Enrichment	30 < Burnup ≤ 35 GWD/MTU - Minimum Cool Time in Years for				
	No CEA (Class 2)	5 Year CEA	10 Year CEA	15 Year CEA	20 Year CEA
1.9 ≤ E < 2.1	5	5	5	5	5
2.1 ≤ E < 2.3	5	5	5	5	5
2.3 ≤ E < 2.5	5	5	5	5	5
2.5 ≤ E < 2.7	5	5	5	5	5
2.7 ≤ E < 2.9	5	5	5	5	5
2.9 ≤ E < 3.1	5	5	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5	5	5
Enrichment	35 < Burnup ≤ 40 GWD/MTU - Minimum Cool Time in Years for				
	No CEA (Class 2)	5 Year CEA	10 Year CEA	15 Year CEA	20 Year CEA
1.9 ≤ E < 2.1	7	7	7	7	7
2.1 ≤ E < 2.3	6	6	6	6	6
2.3 ≤ E < 2.5	6	6	6	6	6
2.5 ≤ E < 2.7	5	6	5	5	5
2.7 ≤ E < 2.9	5	6	5	5	5
2.9 ≤ E < 3.1	5	6	5	5	5
3.1 ≤ E < 3.3	5	5	5	5	5
3.3 ≤ E < 3.5	5	5	5	5	5
3.5 ≤ E < 3.7	5	5	5	5	5
3.7 ≤ E ≤ 4.2	5	5	5	5	5
Enrichment	40 < Burnup ≤45 GWD/MTU - Minimum Cool Time in Years for				
	No CEA (Class 2)	5 Year CEA	10 Year CEA	15 Year CEA	20 Year CEA
1.9 ≤ E < 2.1	11	11	11	11	11
2.1 ≤ E < 2.3	9	9	9	9	9
2.3 ≤ E < 2.5	8	8	8	8	8
2.5 ≤ E < 2.7	7	7	7	7	7
2.7 ≤ E < 2.9	7	7	7	7	7
2.9 ≤ E < 3.1	6	6	6	6	6
3.1 ≤ E < 3.3	6	6	6	6	6
3.3 ≤ E < 3.5	6	6	6	6	6
3.5 ≤ E < 3.7	6	6	6	6	6
3.7 ≤ E ≤ 4.2	6	6	6	6	6

Table B2-10 Loading Table for 10 × 10 Low Burnup BWR Fuel

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	Minimum Cooling Time (years) (Based on Assembly Average Burnup, B, Expressed in GWd/MTU)				
	30 < B ≤ 34	34 < B ≤ 38	38 < B ≤ 39	39 < B ≤ 40	40 < B ≤ 41
1.9 ≤ E < 2.1	-	-	-	-	-
2.1 ≤ E < 2.3	5.0	-	-	-	-
2.3 ≤ E < 2.5	5.0	5.0	-	-	-
2.5 ≤ E < 2.7	5.0	5.0	5.0	5.3	5.5
2.7 ≤ E < 2.9	5.0	5.0	5.0	5.2	5.4
2.9 ≤ E < 3.1	5.0	5.0	5.0	5.1	5.3
3.1 ≤ E < 3.3	5.0	5.0	5.0	5.0	5.2
3.3 ≤ E < 3.5	5.0	5.0	5.0	5.0	5.2
3.5 ≤ E < 3.7	5.0	5.0	5.0	5.0	5.1
3.7 ≤ E < 3.9	5.0	5.0	5.0	5.0	5.0
3.9 ≤ E < 4.1	5.0	5.0	5.0	5.0	5.0
4.1 ≤ E < 4.3	5.0	5.0	5.0	5.0	5.0
4.3 ≤ E < 4.5	5.0	5.0	5.0	5.0	5.0
4.5 ≤ E < 4.7	5.0	5.0	5.0	5.0	5.0
4.7 ≤ E < 4.9	5.0	5.0	5.0	5.0	5.0
E ≥ 4.9	5.0	5.0	5.0	5.0	5.0

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	Minimum Cooling Time (years) (Based on Assembly Average Burnup, B, Expressed in GWd/MTU)				
	41 < B ≤ 42	42 < B ≤ 43	43 < B ≤ 44	44 < B ≤ 45	
1.9 ≤ E < 2.1	-	-	-	-	
2.1 ≤ E < 2.3	-	-	-	-	
2.3 ≤ E < 2.5	-	-	-	-	
2.5 ≤ E < 2.7	5.7	5.9	6.2	-	
2.7 ≤ E < 2.9	5.6	5.8	6.1	6.4	
2.9 ≤ E < 3.1	5.5	5.7	6.0	6.2	
3.1 ≤ E < 3.3	5.5	5.7	5.9	6.1	
3.3 ≤ E < 3.5	5.4	5.6	5.8	6.0	
3.5 ≤ E < 3.7	5.3	5.5	5.7	5.9	
3.7 ≤ E < 3.9	5.2	5.5	5.7	5.9	
3.9 ≤ E < 4.1	5.2	5.4	5.6	5.8	
4.1 ≤ E < 4.3	5.1	5.3	5.5	5.7	
4.3 ≤ E < 4.5	5.0	5.3	5.5	5.7	
4.5 ≤ E < 4.7	5.0	5.2	5.4	5.6	
4.7 ≤ E < 4.9	5.0	5.2	5.4	5.6	
E ≥ 4.9	5.0	5.1	5.3	5.5	

Table B2-11 Loading Table for High Burnup BWR Fuel

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	45 < Assembly Average Burnup ≤ 46 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-
2.1 ≤ E < 2.3	-	-	-
2.3 ≤ E < 2.5	-	-	-
2.5 ≤ E < 2.7	-	-	-
2.7 ≤ E < 2.9	6.1	6.7	6.7
2.9 ≤ E < 3.1	6.0	6.6	6.5
3.1 ≤ E < 3.3	5.9	6.5	6.4
3.3 ≤ E < 3.5	5.8	6.4	6.3
3.5 ≤ E < 3.7	5.7	6.2	6.2
3.7 ≤ E < 3.9	5.7	6.1	6.1
3.9 ≤ E < 4.1	5.6	6.0	6.0
4.1 ≤ E < 4.3	5.5	6.0	5.9
4.3 ≤ E < 4.5	5.5	5.9	5.9
4.5 ≤ E < 4.7	5.4	5.9	5.8
4.7 ≤ E < 4.9	5.4	5.8	5.8
E ≥ 4.9	5.3	5.8	5.7

Table B2-11 Loading Table for High Burnup BWR Fuel (continued)

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	46 < Assembly Average Burnup ≤ 47 GWd/MTU Minimum Cooling Time (years)			47 < Assembly Average Burnup ≤ 48 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	6.4	7.0	6.9	6.7	7.4	7.3
2.9 ≤ E < 3.1	6.3	6.9	6.8	6.6	7.2	7.2
3.1 ≤ E < 3.3	6.1	6.8	6.7	6.4	7.1	7.0
3.3 ≤ E < 3.5	6.0	6.6	6.6	6.3	6.9	6.9
3.5 ≤ E < 3.7	5.9	6.5	6.5	6.2	6.8	6.8
3.7 ≤ E < 3.9	5.9	6.4	6.4	6.1	6.7	6.7
3.9 ≤ E < 4.1	5.8	6.3	6.3	6.0	6.6	6.6
4.1 ≤ E < 4.3	5.7	6.3	6.2	5.9	6.5	6.5
4.3 ≤ E < 4.5	5.7	6.2	6.1	5.9	6.5	6.4
4.5 ≤ E < 4.7	5.6	6.1	6.0	5.8	6.4	6.3
4.7 ≤ E < 4.9	5.6	6.0	6.0	5.8	6.3	6.3
E ≥ 4.9	5.5	6.0	5.9	5.7	6.2	6.2

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	48 < Assembly Average Burnup ≤ 49 GWd/MTU Minimum Cooling Time (years)			49 < Assembly Average Burnup ≤ 50 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	7.0	7.8	7.7	-	-	-
2.9 ≤ E < 3.1	6.8	7.6	7.5	7.1	8.0	7.9
3.1 ≤ E < 3.3	6.7	7.4	7.4	7.0	7.8	7.8
3.3 ≤ E < 3.5	6.6	7.3	7.2	6.9	7.7	7.6
3.5 ≤ E < 3.7	6.5	7.1	7.1	6.8	7.5	7.5
3.7 ≤ E < 3.9	6.4	7.0	7.0	6.6	7.4	7.3
3.9 ≤ E < 4.1	6.3	6.9	6.9	6.6	7.3	7.2
4.1 ≤ E < 4.3	6.2	6.8	6.8	6.5	7.1	7.1
4.3 ≤ E < 4.5	6.1	6.7	6.7	6.4	7.0	7.0
4.5 ≤ E < 4.7	6.0	6.7	6.6	6.3	6.9	6.9
4.7 ≤ E < 4.9	5.9	6.6	6.5	6.2	6.9	6.8
E ≥ 4.9	5.9	6.5	6.5	6.1	6.8	6.7

Table B2-11 Loading Table for High Burnup BWR Fuel (continued)

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	50 < Assembly Average Burnup ≤ 51 GWd/MTU Minimum Cooling Time (years)			51 < Assembly Average Burnup ≤ 52 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	-	-	-	-	-	-
2.9 ≤ E < 3.1	7.5	8.5	8.4	7.9	8.9	8.8
3.1 ≤ E < 3.3	7.3	8.2	8.2	7.7	8.7	8.6
3.3 ≤ E < 3.5	7.2	8.0	8.0	7.6	8.5	8.4
3.5 ≤ E < 3.7	7.0	7.9	7.8	7.4	8.3	8.3
3.7 ≤ E < 3.9	6.9	7.8	7.7	7.3	8.2	8.1
3.9 ≤ E < 4.1	6.8	7.6	7.6	7.1	8.0	7.9
4.1 ≤ E < 4.3	6.7	7.5	7.5	7.0	7.9	7.8
4.3 ≤ E < 4.5	6.6	7.4	7.3	6.9	7.8	7.7
4.5 ≤ E < 4.7	6.6	7.3	7.2	6.8	7.7	7.6
4.7 ≤ E < 4.9	6.5	7.2	7.1	6.7	7.6	7.5
E ≥ 4.9	6.4	7.1	7.0	6.7	7.5	7.4

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	52 < Assembly Average Burnup ≤ 53 GWd/MTU Minimum Cooling Time (years)			53 < Assembly Average Burnup ≤ 54 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	-	-	-	-	-	-
2.9 ≤ E < 3.1	8.3	9.5	9.4	8.7	10.0	9.9
3.1 ≤ E < 3.3	8.1	9.2	9.1	8.5	9.8	9.7
3.3 ≤ E < 3.5	7.9	9.0	8.9	8.3	9.5	9.4
3.5 ≤ E < 3.7	7.8	8.8	8.7	8.1	9.3	9.2
3.7 ≤ E < 3.9	7.6	8.6	8.5	8.0	9.1	9.0
3.9 ≤ E < 4.1	7.5	8.5	8.4	7.8	8.9	8.8
4.1 ≤ E < 4.3	7.4	8.3	8.2	7.7	8.8	8.7
4.3 ≤ E < 4.5	7.2	8.2	8.1	7.6	8.6	8.5
4.5 ≤ E < 4.7	7.1	8.0	7.9	7.5	8.5	8.4
4.7 ≤ E < 4.9	7.0	7.9	7.8	7.4	8.3	8.3
E ≥ 4.9	6.9	7.8	7.8	7.2	8.2	8.1

Table B2-11 Loading Table for High Burnup BWR Fuel (continued)

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	54 < Assembly Average Burnup ≤ 55 GWd/MTU Minimum Cooling Time (years)			55 < Assembly Average Burnup ≤ 56 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	-	-	-	-	-	-
2.9 ≤ E < 3.1	-	-	-	-	-	-
3.1 ≤ E < 3.3	9.0	10.4	10.3	9.5	11.1	11.0
3.3 ≤ E < 3.5	8.8	10.1	10.0	9.2	10.8	10.7
3.5 ≤ E < 3.7	8.6	9.9	9.8	9.0	10.5	10.4
3.7 ≤ E < 3.9	8.4	9.6	9.5	8.8	10.2	10.1
3.9 ≤ E < 4.1	8.2	9.4	9.3	8.7	10.0	9.9
4.1 ≤ E < 4.3	8.0	9.2	9.1	8.5	9.8	9.7
4.3 ≤ E < 4.5	7.9	9.1	9.0	8.3	9.6	9.5
4.5 ≤ E < 4.7	7.8	8.9	8.8	8.2	9.4	9.3
4.7 ≤ E < 4.9	7.7	8.8	8.7	8.0	9.3	9.2
E ≥ 4.9	7.6	8.7	8.6	7.9	9.1	9.0

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	56 < Assembly Average Burnup ≤ 57 GWd/MTU Minimum Cooling Time (years)			57 < Assembly Average Burnup ≤ 58 GWd/MTU Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	-	-	-	-	-	-
2.9 ≤ E < 3.1	-	-	-	-	-	-
3.1 ≤ E < 3.3	10.0	11.8	11.6	10.7	12.5	12.4
3.3 ≤ E < 3.5	9.8	11.5	11.3	10.4	12.1	12.0
3.5 ≤ E < 3.7	9.5	11.2	11.1	10.1	11.8	11.7
3.7 ≤ E < 3.9	9.3	10.9	10.8	9.8	11.6	11.4
3.9 ≤ E < 4.1	9.1	10.7	10.5	9.6	11.3	11.2
4.1 ≤ E < 4.3	8.9	10.4	10.3	9.4	11.1	10.9
4.3 ≤ E < 4.5	8.8	10.2	10.0	9.2	10.8	10.7
4.5 ≤ E < 4.7	8.6	10.0	9.9	9.0	10.6	10.5
4.7 ≤ E < 4.9	8.5	9.8	9.7	8.9	10.4	10.3
E ≥ 4.9	8.3	9.7	9.5	8.8	10.2	10.1

Table B2-11 Loading Table for High Burnup BWR Fuel (continued)

Minimum Initial Assembly Avg. Enrichment, E (wt% ^{235}U)	58 < Assembly Average Burnup ≤ 59 GWd/MTU			59 < Assembly Average Burnup ≤ 60 GWd/MTU		
	Minimum Cooling Time (years)			Minimum Cooling Time (years)		
	8×8	9×9	10×10	8×8	9×9	10×10
1.9 ≤ E < 2.1	-	-	-	-	-	-
2.1 ≤ E < 2.3	-	-	-	-	-	-
2.3 ≤ E < 2.5	-	-	-	-	-	-
2.5 ≤ E < 2.7	-	-	-	-	-	-
2.7 ≤ E < 2.9	-	-	-	-	-	-
2.9 ≤ E < 3.1	-	-	-	-	-	-
3.1 ≤ E < 3.3	11.3	13.3	13.1	-	-	-
3.3 ≤ E < 3.5	11.0	12.9	12.8	11.6	13.7	13.5
3.5 ≤ E < 3.7	10.7	12.6	12.4	11.3	13.4	13.2
3.7 ≤ E < 3.9	10.4	12.3	12.1	11.1	13.0	12.9
3.9 ≤ E < 4.1	10.2	11.9	11.8	10.8	12.7	12.6
4.1 ≤ E < 4.3	9.9	11.7	11.6	10.5	12.4	12.2
4.3 ≤ E < 4.5	9.7	11.5	11.3	10.3	12.1	12.0
4.5 ≤ E < 4.7	9.5	11.3	11.1	10.0	11.9	11.8
4.7 ≤ E < 4.9	9.4	11.1	10.9	9.9	11.7	11.5
E ≥ 4.9	9.2	10.9	10.7	9.7	11.5	11.4

Table B2-12 BWR 8x8, 9x9, and 10x10 Low Enriched Minimum Enrichment Allowed as a Function of Burnup (5-year Minimum Cool Time)

Maximum Assembly Average Burnup [GWd/MTU]	Minimum Enrichment [wt.% ^{235}U]
5	0.711
10	1.3
15	1.5
20	1.7
25	1.9

Table B2-13 Undamaged Fuel Maximum Initial Enrichment

Fuel Type	75% Neutron Absorber Credit	90% Neutron Absorber Credit
	Enrichment (^{235}U wt%)	Enrichment (^{235}U wt%)
ge08n	4.80	5.00
ge08k	4.70	4.90
ge08i	4.70	4.90
ex08b	4.70	4.90
ex09c	4.60	4.70
B9_72A	4.50	4.70
B10_91A	4.50	4.70
B10_92A	4.40	4.60

Table B2-14 Maximum Initial Enrichment with four BWR DFCs loaded with Damaged Fuel

Fuel Type	Maximum Initial Enrichment (^{235}U wt%)	
	75% Neutron Absorber Credit	90% Neutron Absorber Credit
ge08n	4.80	5.00
ge08k	4.70	4.90
ge08i	4.60*	4.90
ex08b	4.70	4.90
ex09c	4.50*	4.70
B9_72A	4.40*	4.60*
B10_91A	4.40*	4.60*
B10_92A	4.40	4.60

*Maximum initial enrichment is 0.1% lower than undamaged uniform loading

Table B2-15 Summary of Preferentially Loaded Fuel Enrichment Combinations – Undamaged BWR Fuel

Outer Locations*	Outer Locations Maximum Enrichment (^{235}U wt%)	Remaining Locations Maximum Enrichment (^{235}U wt%)
LOC1 (Option 1)	4.6	4.5
LOC1 (Option 2)	5.0	4.4
LOC2 (Option 1)	4.6	4.5
LOC2 (Option 2)	5.0	4.4
Peripheral (Option 1)	4.6	4.5
Peripheral (Option 2)	5.0	4.4

*The preferential loading locations are defined in Figure B2-3
Note: Preferential load patterns are only evaluated for 75% absorber credit.

B 3.0 DESIGN FEATURES

B 3.1 Site

B 3.1.1 Site Location

The NAC-UMS® SYSTEM is authorized for general use by 10 CFR Part 50 license holders at various site locations under the provisions of 10 CFR Part 72, Subpart K.

B 3.2 Design Features Important for Criticality Control

B 3.2.1 CANISTER

a) Minimum ^{10}B loading in the neutron absorbers:
   1. PWR – 0.025g/cm^2
   2. BWR – 0.011g/cm^2

b) Minimum length of UNDAMAGED FUEL ASSEMBLY internal structure and bottom end fitting and/or spacers shall ensure the minimum distance to the fuel region from the base of the CANISTER is:
   1. PWR – 3.2 inches
   2. BWR – 6.2 inches

c) Soluble boron concentration in the PWR fuel pool and CANISTER water:
   1. Fuel meeting the enrichment limits in Table B2–2 without boron - 0 ppm.
   2. Fuel meeting the enrichment limits in Table B2–2 with boron ≥ 1000 ppm.

d) Minimum water temperature for PWR fuel to ensure boron is soluble:
   1. Temperature should be 5 - 10°F higher than the minimum needed to ensure solubility.

e) Minimum flux trap (structural disk web) thickness is specified per Figure B2-1 (PWR) and Figure B2-2 (BWR).

(continued)

B 3.3 Codes and Standards

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 1995 Edition with Addenda through 1995, is the governing Code for the NAC-UMS® CANISTER.

The American Concrete Institute Specifications ACI-349 (1985) and ACI-318 (1995) govern the NAC-UMS® CONCRETE CASK design and construction, respectively.

The American National Standards Institute ANSI N14.6 (1993) and NUREG-0612 govern the NAC-UMS® TRANSFER CASK design, operation, fabrication, testing, inspection and maintenance.

B 3.3.1 Exceptions to Codes, Standards, and Criteria

Table B3-1 lists exceptions to the ASME Code for the design of the NAC-UMS® SYSTEM.

B 3.3.2 Construction/Fabrication Exceptions to Codes, Standards, and Criteria

Proposed alternatives to ASME Code, Section III, 1995 Edition with Addenda, through 1995, including exceptions listed in Specification B3.3.1, may be used when authorized by the Director of the Office of Nuclear Material Safety and Safeguards or designee. The request for such alternatives should demonstrate that:

1. The proposed alternatives would provide an acceptable level of quality and safety, or
2. Compliance with the specified requirements of ASME Code, Section III, 1995 Edition with Addenda through 1995, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Requests for exceptions shall be submitted in accordance with 10 CFR 72.4.

Table B3-1 List of ASME Code Exceptions for the NAC-UMS® SYSTEM

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER	NB-1100	Statement of requirements for Code stamping of components.	CANISTER is designed and will be fabricated in accordance with ASME Code, Section III, Subsection NB to the maximum practical extent, but Code stamping is not required. The completion of an ASME Design Specification, Design Report and Overpressure Protection Report is not required.
CANISTER	NB-2000	Requirements for materials to be supplied by ASME-approved material supplier.	Materials will be supplied by NAC-approved suppliers with Certified Material Test Reports (CMTRs) in accordance to NB-2000 requirements.
CANISTER	NB-2500	Repairs to pressure-retaining material from which a defect(s) has been removed are to be examined by magnetic particle or dye penetrant methods. If the depth of the repair exceeds the lesser of 3/8-inch or 10% of the section thickness, examination is to be by radiography.	In accordance with ASME Code Case N-595-4, a loaded CANISTER shell examination of a weld repair of material within 1/2-inch of a closure weld may be done by progressive magnetic particle or dye penetrant examination methods for each weld layer ≤ 1/4-inch and final surface.
CANISTER Shield Lid and Structural Lid Welds	NB-4243	Full penetration welds required for Category C joints (flat head to main shell per NB-3352.3).	Shield lid and structural lid to CANISTER shell welds are not full penetration welds. These field welds are performed independently to provide a redundant closure.
CANISTER Structural Lid Weld	NB-4421	Requires removal of backing ring.	Structural lid to CANISTER shell weld uses a backing ring that is not removed. The backing ring permits completion of the groove weld; it is not considered in any analyses; and it has no detrimental effect on the CANISTER's function.

Table B3-1 List of ASME Code Exceptions for the NAC-UMS® SYSTEM (continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Vent Port Cover and Drain Port Cover to Shield Lid Welds; Shield Lid to Canister Shell Weld	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	Root and final surface liquid penetrant examination to be performed per ASME Code Section V, Article 6, with acceptance in accordance with ASME Code, Section III, NB-5350.
CANISTER Structural Lid to Shell Weld	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	The CANISTER structural lid to CANISTER shell closure weld is performed in the field following fuel assembly loading. The structural lid-to-shell weld will be verified by either ultrasonic (UT) or progressive liquid penetrant (PT) examination. If progressive PT examination is used, at a minimum, it must include the root and final layers and each approximately 3/8 inch of weld depth. If UT examination is used, it will be followed by a final surface PT examination. For either UT or PT examination, the maximum, undetectable flaw size is demonstrated to be smaller than the critical flaw size. The critical flaw size is determined in accordance with ASME Code, Section XI methods. The examination of the weld will be performed by qualified personnel per ASME Code Section V, Articles 5 (UT) and 6 (PT) with acceptance per ASME Code Section III, NB-5332 (UT) per 1995 Addenda, and NB-5350 for (PT).

Table B3-1 List of ASME Code Exceptions for the NAC-UMS® SYSTEM (continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Vessel and Shield Lid	NB-6111	All completed pressure retaining systems shall be pressure tested.	The CANISTER shield lid to shell weld is performed in the field following fuel assembly loading. The CANISTER is then pneumatically (air/nitrogen/ helium-over-water) pressure tested as defined in Chapter 9 and described in Chapter 8. Accessibility for leakage inspections precludes a Code compliant hydrostatic test. The shield lid-to-shell weld is also leak tested to the leak-tight criteria of ANSI N14.5. The vent port and drain port cover welds are examined by root and final PT examination. The structural lid weld is examined by progressive PT or UT and final surface PT.
CANISTER Vessel	NB-7000	Vessels are required to have overpressure protection.	No overpressure protection is provided. The function of the CANISTER is to confine radioactive contents under normal, off-normal, and accident conditions of storage. The CANISTER vessel is designed to withstand a maximum internal pressure considering 100% fuel rod failure and maximum accident temperatures.
CANISTER Vessel	NB-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-UMS® SYSTEM is marked and identified in accordance with 10 CFR Part 72 requirements. Code stamping is not required. The QA data package will be in accordance with NAC's approved QA program. The completion of an ASME Design Specification, Design Report and Overpressure Protection Report is not required.

Table B3-1 List of ASME Code Exceptions for the NAC-UMS® SYSTEM (continued)

Component	Reference ASME Code Section/Article	Code Requirement	Exception, Justification and Compensatory Measures
CANISTER Basket Assembly	NG-2000	Requires materials to be supplied by ASME approved material supplier.	Materials to be supplied by NAC-approved suppliers with CMTRs in accordance with NG-2000 requirements.
CANISTER Basket Assembly	NG-8000	States requirements for nameplates, stamping and reports per NCA-8000.	The NAC-UMS® SYSTEM will be marked and identified in accordance with 10 CFR Part 72 requirements. No Code stamping is required. The CANISTER basket data package will be in accordance with NAC's approved QA program.
CANISTER Vessel and Basket Assembly Material	NB-2130/ NG-2130	States requirements for certification of material organizations and materials to NCA-3861 and NCA-3862, respectively.	The NAC-UMS® CANISTER and Basket Assembly component materials are procured in accordance with the specifications for materials in ASME Code Section II with Certified Material Test Reports. The component materials will be obtained from NAC approved Suppliers in accordance with NAC's approved QA program.

B 3.4 Site Specific Parameters and Analyses

This section presents site-specific parameters and analytical bases that must be verified by the NAC-UMS® SYSTEM user. The parameters and bases presented in Section B.3.4.1 are those applied in the design basis analysis. The parameters and bases used in the evaluation of SITE SPECIFIC FUEL are presented in the appropriate sections below.

B 3.4.1 Design Basis Site Specific Parameters and Analyses

The design basis site-specific parameters and analyses that require verification by the NAC-UMS® SYSTEM user are:

1. The temperature of 76°F is the maximum average yearly temperature. The 3-day average ambient temperature shall be 106°F or less.

2. The allowed temperature extremes, averaged over a 3-day period, shall be greater than –40°F and less than 133°F.

3. a) The design basis earthquake horizontal and vertical seismic acceleration levels at the top surface of the ISFSI pad or at the center of gravity of the loaded concrete cask on the ISFSI pad are bounded by the values shown:

Configuration	**Coefficient of Friction**	**Horizontal g-level in each of Two Orthogonal Directions**	**Corresponding Vertical g-level**
Standard	0.35	0.26g	0.26g
Standard	0.40	0.29g	0.29g

Note: For a condition of a degraded coefficient of friction, site-specific analysis may be performed in accordance with 3.4.1(3)(b).

b) Alternatively, the design basis earthquake motion of the ISFSI pad may be limited so that the acceleration g-load resulting from the collision of two sliding casks remains bounded by the accident condition analyses presented in Chapter 11 of the FSAR.

Site-specific analysis by the cask user shall demonstrate that a cask does not slide off the ISFSI pad.

(continued)

B 3.4.1 Design Basis Site Specific Parameters and Analyses (continued)

4. The analyzed flood condition of 15 fps water velocity and a height of 50 feet of water (full submergence of the loaded cask) are not exceeded.

5. The potential for fire and explosion shall be addressed, based on site-specific considerations. This includes the condition that the fuel tank of the cask handling equipment used to move the loaded CONCRETE CASK onto or from the ISFSI site contains no more than 50 gallons of fuel.

6 In cases where engineered features (i.e., berms, shield walls) are used to ensure that requirements of 10 CFR 72.104(a) are met, such features are to be considered important to safety and must be evaluated to determine the applicable Quality Assurance Category on a site specific basis.

7. TRANSFER CASK OPERATIONS shall only be conducted with surrounding air temperatures ≥ 0°F.

8. The VERTICAL CONCRETE CASK shall only be lifted by the lifting lugs with surrounding air temperatures ≥ 0°F.

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B 3.4.2 Maine Yankee Site Specific Parameters and Analyses

The design basis site-specific parameters and analyses that require verification by Maine Yankee are:

1. The temperature of 76°F is the maximum average yearly temperature. The 3-day average ambient temperature shall be 106°F or less.

2. The allowed temperature extremes, averaged over a 3-day period, shall be greater than –40°F and less than 133°F.

3. The design basis earthquake horizontal and vertical seismic acceleration levels at the top surface of the ISFSI pad are bounded by the values shown:

Configuration	**Coefficient of Friction**	**Horizontal g-level in each of Two Orthogonal Directions[1]**	**Corresponding Vertical g-level (upward)**
Maine Yankee	0.50	0.38	0.38 × 0.667 = 0.253g

[1] Earthquake loads are applied to the center of gravity of the concrete cask on the ISFSI pad.

4. The analyzed flood condition of 15 fps water velocity and a height of 50 feet of water (full submergence of the loaded cask) are not exceeded.

5. The potential for fire and explosion shall be addressed, based on site-specific considerations. This includes the condition that the fuel tank of the cask handling equipment used to move the loaded CONCRETE CASK onto or from the ISFSI site contains no more than 50 gallons of fuel.

6. Physical testing shall be conducted to demonstrate that the coefficient of friction between the concrete cask and ISFSI pad surface is at least 0.5.

(continued)

B 3.4.2 Maine Yankee Site Specific Parameters and Analyses (continued)

7. In addition to the requirements of 10 CFR 72.212(b)(2)(ii), the ISFSI pad(s) and foundation shall meet the design basis earthquake horizontal and vertical seismic acceleration levels at the top surface of the ISFSI pad as specified in B 3.4.2 (3).

   The surface of the ISFSI pad shall have a broom finish or brushed surface as defined in ACI 116R-90 and described in Sections 7.12 and 7.13.4 of ACI 302.1R.

8. In cases where engineered features (i.e., berms, shield walls) are used to ensure that requirements of 10 CFR 72.104(a) are met, such features are to be considered important to safety and must be evaluated to determine the applicable Quality Assurance Category on a site specific basis.

9. TRANSFER CASK OPERATIONS shall only be conducted with surrounding air temperatures ≥ 0°F.

B 3.5 CANISTER HANDLING FACILITY (CHF)

B 3.5.1 TRANSFER CASK and CANISTER Lifting Devices

Movements of the TRANSFER CASK and CANISTER outside of the 10 CFR Part 50 licensed facilities, when loaded with spent fuel are not permitted unless the movements are made with a CANISTER HANDLING FACILITY designed, operated, fabricated, tested, inspected and maintained in accordance with the guidelines of NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants" and the below clarifications. This Technical Specification does not apply to handling heavy loads under a 10 CFR Part 50 license.

B 3.5.2 CANISTER HANDLING FACILITY Structure Requirements

B 3.5.2.1 CANISTER Station and Stationary Lifting Devices

1. The weldment structure of the CANISTER HANDLING FACILITY shall be designed to comply with the stress limits of ASME Code, Section III, Subsection NF, Class 3 for linear structures. The applicable loads, load combinations, and associated service condition definitions are provided in Table B3-2. All compression loaded members shall satisfy the buckling criteria of ASME Code, Section III, Subsection NF.
2. If a portion of the CANISTER HANDLING FACILITY structure is constructed of reinforced concrete, then the factored load combinations set forth in ACI-318 (1995) for the loads defined in Table B3-2 shall apply.
3. The TRANSFER CASK and CANISTER lifting device used with the CANISTER HANDLING FACILITY shall be designed, fabricated, operated, tested, inspected and maintained in accordance with NUREG-0612, Section 5.1.

(continued)

B 3.5.2.1 CANISTER HANDLING Station and Stationary Lifting Devices (continued)

4. The CHF design shall incorporate an impact limiter for CANISTER lifting and movement if a qualified single failure proof crane is not used. The impact limiter must be designed and fabricated to ensure that, if a CANISTER is dropped, the confinement boundary of the CANISTER would not be breached.

B 3.5.2.2 Mobile Lifting Devices

If a mobile lifting device is used as the lifting device, in lieu of a stationary lifting device, it shall meet the guidelines of NUREG-0612, Section 5.1, with the following clarifications:

1. Mobile lifting devices shall have a minimum safety factor of two over the allowable load table for the lifting device in accordance with the guidance of NUREG-0612, Section 5.1.6(1)(a) and shall be capable of stopping and holding the load during a Design Basis Earthquake (DBE) event.
2. Mobile lifting devices shall conform to the requirements of ANSI B30.5, “Mobile and Locomotive Cranes,” in lieu of the requirements of ANSI B30.2, “Overhead and Gantry Cranes.”
3. Mobile cranes are not required to meet the requirements of NUREG-0612, Section 5.1.6(2) for new cranes.

Table B3-2 Load Combinations and Service Condition Definitions for the CANISTER HANDLING FACILITY (CHF) Structure

Load Combination	ASME Section III Service Condition for Definition of Allowable Stress	Comment
D* D + S	Level A	All primary load bearing members must satisfy Level A stress limits
D + M + W'[1] D + F D + E D + Y	Level D	Factor of safety against overturning shall be ≥ 1.1

D = Crane hook dead load
D* = Apparent crane hook dead load
S = Snow and ice load for the CHF site
M = Tornado missile load of the CHF site[1]
W' = Tornado wind load for the CHF site[1]
F = Flood load for the CHF site
E = Seismic load for the CHF site
Y = Tsunami load for the CHF site

Note:
1. Tornado missile load may be reduced or eliminated based on a PRA for the CHF site.