TABLE OF CONTENTS

2.0 APPROVED CONTENTS

2.1 Fuel Specifications and Loading Conditions

2.1.1 Fuel to Be Stored in the HI-STORM FW MPC Storage System

a. UNDAMAGED FUEL ASSEMBLIES, DAMAGED FUEL ASSEMBLIES, FUEL DEBRIS, and NON-FUEL HARDWARE meeting the limits specified in Table 2.1-1 and other referenced tables may be stored in the HI-STORM FW MPC Storage System.

b. All BWR fuel assemblies may be stored with or without ZR channels.

2.1.2 Fuel Loading

Figures 2.1-1 and 2.1-2 define the regions for the MPC-37 and MPC-89 models, respectively. Figures 2.1-3 defines the cell identifications for the MPC-32ML. Fuel assembly decay heat limits are specified in Section 2.3.1. Fuel assemblies shall meet all other applicable limits specified in Tables 2.1-1 through 2.1-3.

2.2 Violations

If any Fuel Specifications or Loading Conditions of 2.1 are violated, the following actions shall be completed:

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

2.2.2 Within 24 hours, notify the NRC Operations Center.

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

Table 2.1-1 (page 1 of 6)
Fuel Assembly Limits

I. MPC MODEL: MPC-37

A. Allowable Contents

1. Uranium oxide PWR UNDAMAGED FUEL ASSEMBLIES, DAMAGED FUEL ASSEMBLIES, and/or FUEL DEBRIS meeting the criteria in Table 2.1-2, with or without NON-FUEL HARDWARE and meeting the following specifications (Note 1):

a. Cladding Type:	ZR
b. Maximum Initial Enrichment:	5.0 wt. % U-235 with soluble boron credit per LCO 3.3.1 OR burnup credit per Section 2.4
c. Post-irradiation Cooling Time and Average Burnup Per Assembly:	Cooling Time ≥ 2 years Assembly Average Burnup ≤ 68.2 GWD/MTU
d. Decay Heat Per Fuel Storage Location:	As specified in Section 2.3
e. Fuel Assembly Length:	≤ 199.2 inches (nominal design including NON-FUEL HARDWARE and DFC)
f. Fuel Assembly Width:	≤ 8.54 inches (nominal design)
g. Fuel Assembly Weight:	≤ 2050 lbs (including NON-FUEL HARDWARE and DFC)

Table 2.1-1 (page 2 of 6)
Fuel Assembly Limits

I. MPC MODEL: MPC-37 (continued)

B. Quantity per MPC: 37 FUEL ASSEMBLIES with up to twelve (12) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS in DAMAGED FUEL CONTAINERS (DFCs). DFCs may be stored in fuel storage locations 3-1, 3-3 through 3-7, 3-10 through 3-14, and 3-16 (see Figure 2.1-1), OR in fuel storage locations 2-1, 2-3, 2-4, 2-5, 2-8, 2-9, 2-10, and 2-12 (see Figure 2.1-1), depending on heat load pattern, see Section 2.3.1. The remaining fuel storage locations may be filled with PWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications. For MPCs utilizing burnup credit, the MPC and DFC loading configuration must also meet the additional requirements of Section 2.4.

C. One (1) Neutron Source Assembly (NSA) is authorized for loading in the MPC-37.

D. Up to thirty (30) BRPAs are authorized for loading in the MPC-37.

Note 1: Fuel assemblies containing BPRAs, TPDs, WABAs, water displacement guide tube plugs, orifice rod assemblies, or vibration suppressor inserts, with or without ITTRs, may be stored in any fuel storage location. Fuel assemblies containing APSRs, RCCAs, CEAs, CRAs (including, but not limited to those with hafnium), or NSAs may only be loaded in fuel storage Regions 1 and 2 (see Figure 2.1-1).

Note 2: DAMAGED FUEL ASSEMBLIES which can be handled by normal means, may be stored in storage locations designated for DFCs using DFIs or DFCs.

Table 2.1-1 (page 3 of 6)
Fuel Assembly Limits

II. MPC MODEL: MPC-89

A. Allowable Contents

1. Uranium oxide BWR UNDAMAGED FUEL ASSEMBLIES, DAMAGED FUEL ASSEMBLIES, and/or FUEL DEBRIS meeting the criteria in Table 2.1-3, with or without channels and meeting the following specifications:

a. Cladding Type:	ZR
b. Maximum PLANAR-AVERAGE INITIAL ENRICHMENT(Note 1):	As specified in Table 2.1-3 for the applicable fuel assembly array/class.
c. Initial Maximum Rod Enrichment	5.0 wt. % U-235
d. Post-irradiation Cooling Time and Average Burnup Per Assembly	
i. Array/Class 8x8F	Cooling time ≥ 10 years and an assembly average burnup ≤ 27.5 GWD/MTU.
ii. All Other Array Classes	Cooling Time ≥ 1.2 years and an assembly average burnup ≤ 65 GWD/MTU
e. Decay Heat Per Assembly	
i. Array/Class 8x8F	≤ 183.5 Watts
ii. All Other Array Classes	As specified in Section 2.3
f. Fuel Assembly Length	≤ 176.5 inches (nominal design)
g. Fuel Assembly Width	≤ 5.95 inches (nominal design)
h. Fuel Assembly Weight	≤ 850 lbs, including a DFC as well as a channel

Table 2.1-1 (page 4 of 6)
Fuel Assembly Limits

II. MPC MODEL: MPC-89 (continued)

B. Quantity per MPC: 89 FUEL ASSEMBLIES with up to sixteen (16) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS in DAMAGED FUEL CONTAINERS (DFCs). DFCs may be stored in fuel storage locations 3-1, 3-3, 3-4, 3-9, 3-10, 3-13, 3-16, 3-19, 3-22, 3-25, 3-28, 3-31, 3-32, 3-37, 3-38, and 3-40 (see Figure 2.1-2), OR in fuel storage locations 2-1, 2-2, 2-6, 2-7, 2-13, 2-18, 2-23, 2-28, 2-34, 2-35, 2-39, and 2-40 (see Figure 2.1-2), depending on heat load pattern, see Section 2.3.1. The remaining fuel storage locations may be filled with BWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications.

Note 1: The lowest maximum allowable enrichment of any fuel assembly loaded in an MPC-89, based on fuel array class and fuel classification, is the maximum allowable enrichment for the remainder of the assemblies loaded in that MPC.

Note 2: DAMAGED FUEL ASSEMBLIES which can be handled by normal means, may be stored in storage locations designated for DFCs using DFIs or DFCs.

Table 2.1-1 (page 6 of 6)
Fuel Assembly Limits

III. MPC MODEL: MPC-32ML (continued)

B. Quantity per MPC: 32 FUEL ASSEMBLIES with up to eight (8) DAMAGED FUEL ASSEMBLIES or FUEL DEBRIS in DAMAGED FUEL CONTAINERS (DFCs). DFCs may be stored in fuel storage locations 1-1, 1-4, 1-5, 1-10, 1-23, 1-28, 1-29, and 1-32 (see Figure 2.1-3). The remaining fuel storage locations may be filled with PWR UNDAMAGED FUEL ASSEMBLIES meeting the applicable specifications.

C. One (1) Neutron Source Assembly (NSA) is authorized for loading in the MPC-32ML.

D. Up to thirty-two (32) BRPAs are authorized for loading in the MPC-32ML.

Note 1: Fuel assemblies containing BPRAs, TPDs, WABAs, water displacement guide tube plugs, orifice rod assemblies, or vibration suppressor inserts, with or without ITTRs, may be stored in any fuel storage location. Fuel assemblies containing APSRs, RCCAs, CEAs, CRAs, or NSAs may only be loaded in fuel cells 1-6 through 1-9, 1-12 through 1-15, 1-18 through 1-21, and 1-24 through 1-27.

Note 2: DAMAGED FUEL ASSEMBLIES which can be handled by normal means, may be stored in storage locations designated for DFCs using DFIs or DFCs.

Table 2.1-2 (page 1 of 5)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1, 7)

Fuel Assembly Array/ Class	**14x14 A**	**14x14 B**	**14x14 C**	**15x15 B**	**15x15 C**
No. of Fuel Rod Locations (Note 6)	179	179	176	204	204
Fuel Clad O.D. (in.)	≥ 0.400	≥ 0.417	≥ 0.440	≥ 0.420	≥ 0.417
Fuel Clad I.D. (in.)	≤ 0.3514	≤ 0.374	≤ 0.3880	≤ 0.3736	≤ 0.3640
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3444	≤ 0.367	≤ 0.3805	≤ 0.3671	≤ 0.3570
Fuel Rod Pitch (in.)	≤ 0.556	≤ 0.566	≤ 0.580	≤ 0.563	≤ 0.563
Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Guide and/or Instrument Tubes	17	17	5 (Note 2)	21	21
Guide/Instrument Tube Thickness (in.)	≥ 0.017	≥ 0.017	≥ 0.038	≥ 0.015	≥ 0.0165

Table 2.1-2 (page 2 of 5)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1,7)

Fuel Assembly Array/Class	**15x15 D**	**15x15 E**	**15x15 F**	**15x15 H**	**15x15 I**
No. of Fuel Rod Locations (Note 6)	208	208	208	208	216 (Note 4)
Fuel Clad O.D. (in.)	≥ 0.430	≥ 0.428	≥ 0.428	≥ 0.414	≥ 0.413
Fuel Clad I.D. (in.)	≤ 0.3800	≤ 0.3790	≤ 0.3820	≤ 0.3700	≤ 0.3670
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3735	≤ 0.3707	≤ 0.3742	≤ 0.3622	≤ 0.3600
Fuel Rod Pitch (in.)	≤ 0.568	≤ 0.568	≤ 0.568	≤ 0.568	≤ 0.550
Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Guide and/or Instrument Tubes	17	17	17	17	9 (Note 4)
Guide/Instrument Tube Thickness (in.)	≥ 0.0150	≥ 0.0140	≥ 0.0140	≥ 0.0140	≥ 0.0140

Table 2.1-2 (page 3 of 5)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1,7)

Fuel Assembly Array and Class	**16x16 A**	**16x16B**	**16x16C**	**16x16D (Note5)**
No. of Fuel Rod Locations (Note 6)	236	236	235	236
Fuel Clad O.D. (in.)	≥ 0.382	≥ 0.374	≥ 0.374	≥ 0.423
Fuel Clad I.D. (in.)	≤ 0.3350	≤ 0.3290	≤ 0.3290	≤ 0.366
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3255	≤ 0.3225	≤ 0.3225	≤ 0.359
Fuel Rod Pitch (in.)	≤ 0.506	≤ 0.506	≤ 0.485	≤ 0.563
Active Fuel length (in.)	≤ 150	≤ 150	≤ 150	≤ 154.5
No. of Guide and/or Instrument Tubes	5 (Note 2)	5 (Note 2)	21	20
Guide/Instrument Tube Thickness (in.)	≥ 0.0350	≥ 0.04	≥ 0.0157	≥ 0.015

Table 2.1-2 (page 4 of 5)
PWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1,7)

Fuel Assembly Array and Class	**17x17A**	**17x17 B**	**17x17 C**	**17x17 D**	**17x17 E**
No. of Fuel Rod Locations (Note 6)	264	264	264	264	265
Fuel Clad O.D. (in.)	≥ 0.360	≥ 0.372	≥ 0.377	≥ 0.372	≥ 0.372
Fuel Clad I.D. (in.)	≤ 0.3150	≤ 0.3310	≤ 0.3330	≤ 0.3310	≤ 0.3310
Fuel Pellet Dia. (in.) (Note 3)	≤ 0.3088	≤ 0.3232	≤ 0.3252	≤ 0.3232	≤ 0.3232
Fuel Rod Pitch (in.)	≤ 0.496	≤ 0.496	≤ 0.502	≤ 0.496	≤ 0.496
Active Fuel length (in.)	≤ 150	≤ 150	≤ 150	≤ 170	≤ 170
No. of Guide and/or Instrument Tubes	25	25	25	25	24
Guide/Instrument Tube Thickness (in.)	≥ 0.016	≥ 0.014	≥ 0.020	≥ 0.014	≥ 0.014

Notes:

1. All dimensions are design nominal values. Maximum and minimum dimensions are specified to bound variations in design nominal values among fuel assemblies within a given array/class.
2. Each guide tube replaces four fuel rods.
3. Annular fuel pellets are allowed in the top and bottom 12” of the active fuel length, except as noted below.
4. Assemblies have one Instrument Tube and eight Guide Bars (Solid ZR). Some assemblies have up to 16 fuel rods removed or replaced by Guide Tubes
5. This fuel array/class only allowable for loading in the MPC-32ML.
6. Any number of fuel rods in an assembly can be replaced by irradiated or unirradiated Steel or Zirconia rods. If the rods are irradiated, the site specific dose and dose rate analyses performed under 10 CFR 72.212 should include considerations for the presence of such rods.
7. Any number of fuel rods in an assembly can contain BLEU fuel. If the BLEU rods are present, the site specific dose and dose rate analyses performed under 10 CFR 72.212 should include considerations for the presence of such rods.

Table 2.1-3 (page 1 of 5)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1, 17)

Fuel Assembly Array and Class	7x7 B	7x7 C	8x8 B	8x8 C	8x8 D	8x8 E
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations (Full Length or Total/Full Length) (Note 16)	49	48	63 or 64	62	60 or 61	59
Fuel Clad O.D. (in.)	≥ 0.5630	≥ 0.5630	≥ 0.4840	≥ 0.4830	≥ 0.4830	≥ 0.4930
Fuel Clad I.D. (in.)	≤ 0.4990	≤ 0.4990	≤ 0.4295	≤ 0.4250	≤ 0.4230	≤ 0.4250
Fuel Pellet Dia. (in.)	≤ 0.4910	≤ 0.4910	≤ 0.4195	≤ 0.4160	≤ 0.4140	≤ 0.4160
Fuel Rod Pitch (in.)	≤ 0.738	≤ 0.738	≤ 0.642	≤ 0.641	≤ 0.640	≤ 0.640
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	0	1 (Note 15)	1 or 0	2	1 - 4 (Note 6)	5
Water Rod Thickness (in.)	N/A	N/A	≥ 0.034	> 0.00	> 0.00	≥ 0.034
Channel Thickness (in.)	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.100

Table 2.1-3 (2 of 5)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1, 17)

Fuel Assembly Array and Class	**8x8F**	**8x8G**	**9x9 A**	**9x9 B**	**9x9 C**	**9x9 D**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.5 (Note 12)	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations (Note 16)	64	60	74/66 (Note 4)	72	80	79
Fuel Clad O.D. (in.)	≥ 0.4576	≥ 0.5015	≥ 0.4400	≥ 0.4330	≥ 0.4230	≥ 0.4240
Fuel Clad I.D. (in.)	≤ 0.3996	≤ 0.4295	≤ 0.3840	≤ 0.3810	≤ 0.3640	≤ 0.3640
Fuel Pellet Dia. (in.)	≤ 0.3913	≤ 0.4195	≤ 0.3760	≤ 0.3740	≤ 0.3565	≤ 0.3565
Fuel Rod Pitch (in.)	≤ 0.609	≤ 0.642	≤ 0.566	≤ 0.572	≤ 0.572	≤ 0.572
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	N/A (Note 2)	4 (Note 15)	2	1 (Note 5)	1	2
Water Rod Thickness (in.)	≥ 0.0315	N/A	> 0.00	> 0.00	≥ 0.020	≥ 0.0300
Channel Thickness (in.)	≤ 0.055	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.100	≤ 0.100

Table 2.1-3 (page 3 of 5)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Notes 1, 17)

Fuel Assembly Array and Class	**9x9 E (Note 2)**	**9x9 F (Note 2)**	**9x9 G**	**10x10 A**	**10x10 B**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.5 (Note 12)	≤ 4.5 (Note 12)	≤ 4.8	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations (Note 16)	76	76	72	92/78 (Note 7)	91/83 (Note 8)
Fuel Clad O.D. (in.)	≥0.4170	≥0.4430	≥0.4240	≥0.4040	≥0.3957
Fuel Clad I.D. (in.)	≤0.3640	≤0.3860	≤0.3640	≤ 0.3520	≤ 0.3480
Fuel Pellet Dia. (in.)	≤0.3530	≤0.3745	≤0.3565	≤ 0.3455	≤ 0.3420
Fuel Rod Pitch (in.)	≤ 0.572	≤ 0.572	≤ 0.572	≤ 0.510	≤ 0.510
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	5	5	1 (Note 5)	2	1 (Note 5)
Water Rod Thickness (in.)	≥0.0120	≥0.0120	≥0.0320	≥0.0300	> 0.00
Channel Thickness (in.)	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120	≤ 0.120

Table 2.1-3 (page 4 of 5)
BWR FUEL ASSEMBLY CHARACTERISTICS
(Note 1,17)

Fuel Assembly Array and Class	**10x10 C**	**10x10 F**	**10x10 G**	**10x10 I**	**11x11 A**
Maximum Planar-Average Initial Enrichment (wt.% ^{235}U) (Note 14)	≤ 4.8	≤ 4.7 (Note 13)	≤ 4.6 (Note 12)	≤ 4.8	≤ 4.8
No. of Fuel Rod Locations (Note 16)	96	92/78 (Note 7)	96/84	91/79	112/92
Fuel Clad O.D. (in.)	≥ 0.3780	≥ 0.4035	≥ 0.387	≥ 0.4047	≥ 0.3701
Fuel Clad I.D. (in.)	≤ 0.3294	≤ 0.3570	≤ 0.340	≤ 0.3559	≤ 0.3252
Fuel Pellet Dia. (in.)	≤ 0.3224	≤ 0.3500	≤ 0.334	≤ 0.3492	≤ 0.3193
Fuel Rod Pitch (in.)	≤ 0.488	≤ 0.510	≤ 0.512	≤ 0.5100	≤ 0.4705
Design Active Fuel Length (in.)	≤ 150	≤ 150	≤ 150	≤ 150	≤ 150
No. of Water Rods (Note 10)	5 (Note 9)	2	5 (Note 9)	1 (Note 5)	1 (Note 5)
Water Rod Thickness (in.)	≥ 0.031	≥ 0.030	≥ 0.031	≥ 0.0315	≥ 0.0340
Channel Thickness (in.)	≤ 0.055	≤ 0.120	≤ 0.060	≤ 0.100	≤ 0.100

NOTES:

1. All dimensions are design nominal values. Maximum and minimum dimensions are specified to bound variations in design nominal values among fuel assemblies within a given array/class.
2. This assembly is known as “QUAD+.” It has four rectangular water cross segments dividing the assembly into four quadrants.
3. For the SPC 9x9-5 fuel assembly, each fuel rod must meet either the 9x9E or the 9x9F set of limits or clad O.D., clad I.D., and pellet diameter.
4. This assembly class contains 74 total rods; 66 full length rods and 8 partial length rods.
5. Square, replacing nine fuel rods.
6. Variable.
7. This assembly contains 92 total fuel rods; 78 full length rods and 14 partial length rods.
8. This assembly class contains 91 total fuel rods; 83 full length rods and 8 partial length rods.
9. One diamond-shaped water rod replacing the four center fuel rods and four rectangular water rods dividing the assembly into four quadrants.
10. These rods may also be sealed at both ends and contain ZR material in lieu of water.
11. Not used.
12. When loading fuel assemblies classified as DAMAGED FUEL, all assemblies in the MPC are limited to 4.0 wt.% U-235.
13. When loading fuel assemblies classified as DAMAGED FUEL, all assemblies in the MPC are limited to 4.6 wt.% U-235.
14. In accordance with the definition of UNDAMAGED FUEL, certain assemblies may be limited to 3.3 wt.% U-235. When loading these fuel assemblies, all assemblies in the MPC are limited to 3.3 wt.% U-235.
15. These fuel designs do not have water rods, but instead contain solid zirc rods.
16. Any number of fuel rods in an assembly can be replaced by irradiated or unirradiated Steel or Zirconia rods. If the rods are irradiated, the site specific dose and dose rate analyses performed under 10 CFR 72.212 should include considerations for the presence of such rods.
17. Any number of fuel rods in an assembly can be contain BLEU fuel. If the BLEU rods are present, the site specific dose and dose rate analyses performed under 10 CFR 72.212 should include considerations for the presence of such rods.

2.3 Decay Heat Limits

This section provides the limits on fuel assembly decay heat for storage in the HI-STORM FW System. The method to verify compliance, including examples, is provided in Chapter 13 of the HI-STORM FW FSAR.

2.3.1 Fuel Loading Decay Heat Limits

Tables 2.3-1A, 2.3-1B, and 2.3-1C provide the maximum allowable decay heat per fuel storage location for MPC-37. Tables 2.3-2A and 2.3-2B provide the maximum allowable decay heat per fuel storage location for MPC-89. The limits in these tables are applicable when using FHD to dry moderate or high burnup fuel and when using VDS to dry moderate burnup fuel only. Tables 2.3-3 and 2.3-4 provide the maximum allowable decay heat per fuel storage location for MPC-37 and MPC-89, respectively, when using VDS to dry high burnup fuel. Table 2.3-5 provides the maximum allowable decay heat per fuel storage location for the MPC-32ML for both FHD and VDS drying. The per cell limits in these tables apply to cells containing undamaged fuel or damaged fuel in DFCs/DFIs or fuel debris in DFCs.

Figures 2.3-1 through 2.3-14 provide alternative loading patterns for the MPC-37 and MPC-89, with undamaged fuel and a combination of undamaged fuel and damaged fuel in DFCs/DFIs and fuel debris in DFCs. The per cell limits in these figures are applicable when using vacuum drying or FHD to dry moderate or high burnup fuel in accordance with Table 3-1 of Appendix A of the CoC. The MPC-37 patterns are based on the fuel length to be stored in the MPC, see Table 2.3-6.

A minor deviation from the prescribed loading pattern in an MPC's permissible contents to allow one slightly thermally-discrepant fuel assembly per quadrant to be loaded as long as the peak cladding temperature for the MPC remains below the ISG-11 Rev 3 requirements is permitted for essential dry storage campaigns to support decommissioning.

TABLE 2.3-1A
MPC-37 HEAT LOAD DATA (See Figure 2.1-1)

Number of Regions: 3					
Number of Storage Cells: 37					
Maximum Design Basis Heat Load (kW): 44.09 (Pattern A); 45.0 (Pattern B)					
Region No.	Decay Heat Limit per Cell, kW		Number of Cells per Region	Decay Heat Limit per Region, kW	
	Pattern A	Pattern B		Pattern A	Pattern B
1	1.05	1.0	9	9.45	9.0
2	1.70	1.2	12	20.4	14.4

TABLE 2.3-5 MPC-32ML HEAT LOAD DATA		
Number of Regions: 1		
Number of Storage Cells: 32		
Pattern	Maximum Heat Load, kW	Decay Heat Limit per Cell, kW
Pattern A	44.16	1.380
Pattern B	28.70	0.897

TABLE 2.3-6 PWR FUEL LENGTH CATEGORIES	
Category	Length Range
Short Fuel	128 inches ≤ L < 144 inches
Standard Fuel	144 inches ≤ L < 168 inches
Long Fuel	L ≥ 168 inches
Notes: 1. "L" means "nominal active fuel length". The nominal, unirradiated active fuel length of the PWR fuel assembly is used to designate it as "short", "standard" and "long".	

2.3.2 When complying with the maximum fuel storage location decay heat limits, users must account for the decay heat from both the fuel assembly and any NON-FUEL HARDWARE, as applicable for the particular fuel storage location, to ensure the decay heat emitted by all contents in a storage location does not exceed the limit.

		0.45 (D/F)	**0.45**	**0.45 (D/F)**		
	0.45 (D/F)	**3.2**	**0.5**	**3.2**	**0.45 (D/F)**	
0.6 (D/F)	**2.4**	**0.5**	**0.6**	**0.5**	**2.4**	**0.6 (D/F)**
0.6	**0.5**	**0.6**	**0.5**	**0.6**	**0.5**	**0.6**
0.6 (D/F)	**2.4**	**0.5**	**0.6**	**0.5**	**2.4**	**0.6 (D/F)**
	0.45 (D/F)	**3.2**	**0.5**	**3.2**	**0.45 (D/F)**	
		0.45 (D/F)	**0.45**	**0.45 (D/F)**		

Figure 2.3-1: Loading Pattern 37C1 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC "Short" Fuel per Cell Heat Load Limits

(**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by "D/F".)

		0.45	0.45	0.45		
	0.45	3.2 (D)	Empty	3.2 (D)	0.45	
0.6	2.4 (D)	Empty	0.6	Empty	2.4 (D)	0.6
0.6	0.5	0.6	0.5	0.6	0.5	0.6
0.6	2.4 (D)	Empty	0.6	Empty	2.4 (D)	0.6
	0.45	3.2 (D)	Empty	3.2 (D)	0.45	
		0.45	0.45	0.45		

Figure 2.3-2: Loading Pattern 37C2 for MPC-37 Containing Undamaged and Damaged Fuel in DFC/DFI/, “Short” Fuel per Cell Heat Load Limits

(**All storage cell heat loads are in kW**, Undamaged Fuel or Damaged Fuel in a DFC and/or using DFIs may be stored in cells denoted by “D.” Cells denoted as “Empty” must remain empty regardless of the contents of the adjacent cell)

		0.45	0.45	0.45		
	0.45	3.2 (D/F)	Empty	3.2 (D/F)	0.45	
0.6	2.4	Empty	0.6	Empty	2.4	0.6
0.6	0.5	0.6	0.5	0.6	0.5	0.6
0.6	2.4	Empty	0.6	Empty	2.4	0.6
	0.45	3.2 (D/F)	Empty	3.2 (D/F)	0.45	
		0.45	0.45	0.45		

Figure 2.3-3: Loading Pattern 37C3 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC, “Short” Fuel per Cell Heat Load Limits (**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.” Cells denoted as “Empty” must remain empty regardless of the contents of the adjacent cell)

		0.55 (D/F)	**0.55**	**0.55 (D/F)**		
	0.55 (D/F)	**3.2**	**0.55**	**3.2**	**0.55 (D/F)**	
0.75 (D/F)	**2.4**	**0.55**	**0.65**	**0.55**	**2.4**	**0.75 (D/F)**
0.75	**0.55**	**0.65**	**0.55**	**0.65**	**0.55**	**0.75**
0.75 (D/F)	**2.4**	**0.55**	**0.65**	**0.55**	**2.4**	**0.75 (D/F)**
	0.55 (D/F)	**3.2**	**0.55**	**3.2**	**0.55 (D/F)**	
		0.55 (D/F)	**0.55**	**0.55 (D/F)**		

Figure 2.3-4: Loading Pattern 37D1 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFCs, “Standard” Fuel per Cell Heat Load Limits

(**All Storage cell heat loads are in kW,** Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.)

		0.55	0.55	0.55		
	0.55	3.2 (D)	Empty	3.2 (D)	0.55	
0.75	2.4 (D)	Empty	0.65	Empty	2.4 (D)	0.75
0.75	0.55	0.65	0.55	0.65	0.55	0.75
0.75	2.4 (D)	Empty	0.65	Empty	2.4 (D)	0.75
	0.55	3.2 (D)	Empty	3.2 (D)	0.55	
		0.55	0.55	0.55		

Figure 2.3-5: Loading Pattern 37D2 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs,“Standard” Fuel per Cell Heat Load Limits

(**All storage cell heat loads are in kW**, “D” Undamaged Fuel or Damaged Fuel in a DFC and/or using DFIs may be stored in cells denoted by “D.” Cells denoted as “Empty” must remain empty regardless of the contents of the adjacent cell)

		0.55	0.55	0.55		
	0.55	3.2 (D/F)	Empty	3.2 (D/F)	0.55	
0.75	2.4	Empty	0.65	Empty	2.4	0.75
0.75	0.55	0.65	0.55	0.65	0.55	0.75
0.75	2.4	Empty	0.65	Empty	2.4	0.75
	0.55	3.2 (D/F)	Empty	3.2 (D/F)	0.55	
		0.55	0.55	0.55		

Figure 2.3-6: Loading Pattern 37D3 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC, "Standard" Fuel per Cell Heat Load Limits

(**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by "D/F." Cells denoted as "Empty" must remain empty regardless of the contents of the adjacent cell.)

		0.65 (D/F)	0.65	0.65 (D/F)		
	0.65 (D/F)	3.5	0.65	3.5	0.65 (D/F)	
0.85 (D/F)	2.6	0.65	0.75	0.65	2.6	0.85 (D/F)
0.85	0.65	0.75	0.65	0.75	0.65	0.85
0.85 (D/F)	2.6	0.65	0.75	0.65	2.6	0.85 (D/F)
	0.65 (D/F)	3.5	0.65	3.5	0.65 (D/F)	
		0.65 (D/F)	0.65	0.65 (D/F)		

Figure 2.3-7: Loading Pattern 37E1 for MPC-37 Loading Pattern for MPCs Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFCs, “Long” Fuel per Cell Heat Load Limits

(**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.”)

		0.65	0.65	0.65		
	0.65	3.5 (D)	Empty	3.5 (D)	0.65	
0.85	2.6 (D)	Empty	0.75	Empty	2.6 (D)	0.85
0.85	0.65	0.75	0.65	0.75	0.65	0.85
0.85	2.6 (D)	Empty	0.75	Empty	2.6 (D)	0.85
	0.65	3.5 (D)	Empty	3.5 (D)	0.65	
		0.65	0.65	0.65		

Figure 2.3-8: Loading Pattern 37E2 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs, "Long" Fuel per Cell Heat Load Limits
(**All storage cell heat loads are in kW**, "D" means Undamaged Fuel or Damaged Fuel in a DFC and/or using DFIs may be stored in cells denoted by "D." Cells denoted as "Empty" must remain empty regardless of the contents of the adjacent cell)

		0.65	0.65	0.65		
	0.65	3.5 (D/F)	Empty	3.5 (D/F)	0.65	
0.85	2.6	Empty	0.75	Empty	2.6	0.85
0.85	0.65	0.75	0.65	0.75	0.65	0.85
0.85	2.6	Empty	0.75	Empty	2.6	0.85
	0.65	3.5 (D/F)	Empty	3.5 (D/F)	0.65	
		0.65	0.65	0.65		

Figure 2.3-9: Loading Pattern 37E3 for MPC-37 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC, “Long” Fuel per Cell Heat Load Limits (**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.” Cells denoted as “Empty” must remain empty regardless of the contents of the adjacent cell)

				0.25 (D/F)	0.25	0.25 (D/F)				
		0.25 (D/F)	0.25	0.25	1.45	0.25	0.25	0.25 (D/F)		
	0.25 (D/F)	0.25	1.45	0.9	0.9	0.9	1.45	0.25	0.25 (D/F)	
	0.25	1.45	0.32	0.32	0.32	0.32	0.32	1.45	0.25	
0.25 (D/F)	0.25	0.9	0.32	0.32	0.32	0.32	0.32	0.9	0.25	0.25 (D/F)
0.25	1.45	0.9	0.32	0.32	0.32	0.32	0.32	0.9	1.45	0.25
0.25 (D/F)	0.25	0.9	0.32	0.32	0.32	0.32	0.32	0.9	0.25	0.25 (D/F)
	0.25	1.45	0.32	0.32	0.32	0.32	0.32	1.45	0.25	
	0.25 (D/F)	0.25	1.45	0.9	0.9	0.9	1.45	0.25	0.25 (D/F)	
		0.25 (D/F)	0.25	0.25	1.45	0.25	0.25	0.25 (D/F)		
				0.25 (D/F)	0.25	0.25 (D/F)				

Figure 2.3-10: Loading Pattern 89A1 for MPC-89 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC, per Cell Heat Load Limits (**All Storage cell heat loads are in kW,** Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.”)

				0.25	0.25	0.25				
		0.25	0.25	0.25	1.45 (D/F)	0.25	0.25	0.25		
	0.25	0.25	1.45 (D/F)	0.9	0.9	0.9	1.45 (D/F)	0.25	0.25	
	0.25	1.45 (D/F)	Empty	0.32	0.32	0.32	Empty	1.45 (D/F)	0.25	
0.25	0.25	0.9	0.32	0.32	0.32	0.32	0.32	0.9	0.25	0.25
0.25	1.45 (D/F)	0.9	0.32	0.32	0.32	0.32	0.32	0.9	1.45 (D/F)	0.25
0.25	0.25	0.9	0.32	0.32	0.32	0.32	0.32	0.9	0.25	0.25
	0.25	1.45 (D/F)	Empty	0.32	0.32	0.32	Empty	1.45 (D/F)	0.25	
	0.25	0.25	1.45 (D/F)	0.9	0.9	0.9	1.45 (D/F)	0.25	0.25	
		0.25	0.25	0.25	1.45 (D/F)	0.25	0.25	0.25		
				0.25	0.25	0.25				

Figure 2.3-11: Loading Pattern 89A2 for MPC-89 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFCs, per Cell Heat Load Limits (**All Storage cell heat loads are in kW,** Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.” Cells denoted as “Empty” must remain empty regardless of the contents of the adjacent cell.)

				0.11 (D/F)	0.47	0.11 (D/F)				
		0.19 (D/F)	0.23	0.68	1.46	0.68	0.23	0.19 (D/F)		
	0.25 (D/F)	0.27	1.42	1.05	0.40	1.05	1.42	0.27	0.25 (D/F)	
	0.23	1.44	0.29	0.31	0.33	0.31	0.29	1.44	0.23	
0.10 (D/F)	0.71	0.72	0.36	0.28	0.21	0.28	0.36	0.72	0.71	0.10 (D/F)
0.40	1.46	0.47	0.33	0.21	0.10	0.21	0.33	0.47	1.46	0.40
0.10 (D/F)	0.71	0.72	0.36	0.28	0.21	0.28	0.36	0.72	0.71	0.10 (D/F)
	0.23	1.44	0.29	0.31	0.33	0.31	0.29	1.44	0.23	
	0.25 (D/F)	0.27	1.42	1.05	0.40	1.05	1.42	0.27	0.25 (D/F)	
		0.19 (D/F)	0.23	0.68	1.46	0.68	0.23	0.19 (D/F)		
				0.11 (D/F)	0.47	0.11 (D/F)				

Figure 2.3-12: Loading Pattern 89B1 for MPC-89 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC, per cell Heat Load Limits
(**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by "D/F.")

				0.11	0.47	0.11				
		0.19	0.23	0.68	1.46 (D/F)	0.68	0.23	0.19		
	0.25	0.27	1.42 (D/F)	1.05	0.40	1.05	1.42 (D/F)	0.27	0.25	
	0.23	1.44 (D/F)	Empty	0.31	0.33	0.31	Empty	1.44 (D/F)	0.23	
0.10	0.71	0.72	0.36	0.28	0.21	0.28	0.36	0.72	0.71	0.10
0.40	1.46 (D/F)	0.47	0.33	0.21	0.10	0.21	0.33	0.47	1.46 (D/F)	0.40
0.10	0.71	0.72	0.36	0.28	0.21	0.28	0.36	0.72	0.71	0.10
	0.23	1.44 (D/F)	Empty	0.31	0.33	0.31	Empty	1.44 (D/F)	0.23	
	0.25	0.27	1.42 (D/F)	1.05	0.40	1.05	1.42 (D/F)	0.27	0.25	
		0.19	0.23	0.68	1.46 (D/F)	0.68	0.23	0.19		
				0.11	0.47	0.11				

Figure 2.3-13: Loading Pattern 89B2 for MPC-89 Containing Undamaged and Damaged Fuel in DFCs/DFIs, and/or Fuel Debris in DFC, per Cell Heat Load Limits(**All Storage cell heat loads are in kW**, Undamaged Fuel, or Damaged Fuel in DFCs and/or using DFIs, and/or Fuel Debris in a DFC may be stored in cells denoted by “D/F.” Cells denoted as “Empty” must remain empty regardless of the contents of the adjacent cell.)

				3.5	2.4	3.5				
		3.5	3.5	1.8	1.2	1.8	3.5	3.5		
	3.5	2.4	1.2	1.2	2.4	1.2	1.2	2.4	3.5	
	3.5	1.2	2.4	2.4	2.4	2.4	2.4	1.2	3.5	
3.5	1.8	1.2	2.4	2.4	3.5	2.4	2.4	1.2	1.8	3.5
2.4	1.2	2.4	2.4	3.5	3.5	3.5	2.4	2.4	1.2	2.4
3.5	1.8	1.2	2.4	2.4	3.5	2.4	2.4	1.2	1.8	3.5
	3.5	1.2	2.4	2.4	2.4	2.4	2.4	1.2	3.5	
	3.5	2.4	1.2	1.2	2.4	1.2	1.2	2.4	3.5	
		3.5	3.5	1.8	1.2	1.8	3.5	3.5		
				3.5	2.4	3.5				

Figure 2.3-14: Minimum Cooling Time Limits for Loading Patterns 89B1 and 89B2 for MPC-89,
per Cell Limits
(All Storage cell cooling time limits are in years)

TABLE 2.4-2
BURNUP CREDIT CONFIGURATIONS

Configuration	Description
Configuration 1	Spent UNDAMAGED fuel assemblies are placed in all positions of the basket
Configuration 2	Fresh UNDAMAGED fuel assemblies are placed in locations 3-4, 3-5, 3-12, and 3-13 (see Figure 2.1-1); spent UNDAMAGED fuel assemblies are placed in the remaining positions
Configuration 3	Damaged Fuel Containers (DFCs) and/or Damaged Fuel Isolators (DFIs) with spent DAMAGED fuel assemblies are placed in locations 3-1, 3-3, 3-4, 3-5, 3-6, 3-7, 3-10, 3-11, 3-12, 3-13, 3-14, and 3-16 (see Figure 2.1-1); spent UNDAMAGED fuel assemblies are placed in the remaining positions
Configuration 4	DFCs with Damaged Fuel and/or fresh FUEL DEBRIS are placed in locations 3-1, 3-7, 3-10, and 3-16 with locations 2-1, 2-5, 2-8, and 2-12 (see Figure 2.1-1) empty; spent UNDAMAGED fuel assemblies are placed in the remaining positions

3.0 DESIGN FEATURES

3.1 Site

3.1.1 Site Location

The HI-STORM FW Cask System is authorized for general use by 10 CFR Part 50 license holders at various site locations under the provisions of 10 CFR 72, Subpart K.

3.2 Design Features Important for Criticality Control

3.2.1 MPC-37

1. Basket cell ID: 8.92 in. (min.)
2. Basket cell wall thickness: 0.57 in. (min.)
3. B_4C in the Metamic-HT: 10.0 wt % (min.)

3.2.2 MPC-89

1. Basket cell ID: 5.99 in. (min.)
2. Basket cell wall thickness: 0.38 in. (min.)
3. B_4C in the Metamic-HT: 10.0 wt % (min.)

3.2.3 Neutron Absorber Tests

1. The weight percentage of the boron carbide must be confirmed to be greater than or equal to 10% in each lot of Al/B4C powder.
2. The areal density of the B-10 isotope corresponding to the 10% min. weight density in the manufactured Metamic HT panels shall be independently confirmed by the neutron attenuation test method by testing at least one coupon from a randomly selected panel in each lot.
3. If the B-10 areal density criterion in the tested panels fails to meet the specific minimum, then the manufacturer has the option to reject the entire lot or to test a statistically significant number of panels and perform statistical analysis for acceptance.
4. All test procedures used in demonstrating compliance with the above requirements shall conform to the cask designer's QA program which has been approved by the USNRC under docket number 71-0784.

3.2.4 MPC-32ML

1. Basket cell ID: 9.53 (min.)
2. Basket cell wall thickness: 0.57 in (min.)
3. B_4C in the Metamic-HT: 10.0wt% (min.)

3.3 Codes and Standards

The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 2007 Edition, is the governing Code for the HI-STORM FW System MPC as clarified in Specification 3.3.1 below, except for Code Sections V and IX. The ASME Code paragraphs applicable to the HI-STORM FW OVERPACK and TRANSFER CASK are listed in Table 3-2. The latest effective editions of ASME Code Sections V and IX, including addenda, may be used for activities governed by those sections, provided a written reconciliation of the later edition against the 2007 Edition, including any addenda, is performed by the certificate holder. American Concrete Institute (ACI) 349-85 is the governing Code for plain concrete as clarified in Appendix 1.D of the Final Safety Analysis Report for the HI-STORM 100 Cask System.

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC basket supports and lift lugs	NB-1130	NB-1132.2(d) requires that the first connecting weld of a non-pressure retaining structural attachment to a component shall be considered part of the component unless the weld is more than 2t from the pressure retaining portion of the component, where t is the nominal thickness of the pressure retaining material. NB-1132.2(e) requires that the first connecting weld of a welded nonstructural attachment to a component shall conform to NB-4430 if the connecting weld is within 2t from the pressure retaining portion of the component.	The lugs that are used exclusively for lifting an empty MPC are welded to the inside of the pressure-retaining MPC shell, but are not designed in accordance with Subsection NB. The lug-to-Enclosure Vessel Weld is required to meet the stress limits of Reg. Guide 3.61 in lieu of Subsection NB of the Code.
MPC Enclosure Vessel	NB-2000	Requires materials to be supplied by ASME-approved material supplier.	Materials will be supplied by Holtec approved suppliers with Certified Material Test Reports (CMTRs) in accordance with NB-2000 requirements.
MPC Enclosure Vessel	NB-2121	Provides permitted material specification for pressure-retaining material, which must conform to Section II, Part D, Tables 2A and 2B	Certain duplex stainless steels are not included in Section II, Part D, Tables 2A and 2B. These stainless steel alloys are evaluated in the HI-STORM FW FSAR and meet the required design criteria for use in the HI-STORM FW system.
MPC Enclosure Vessel	NB-3100 NF-3100	Provides requirements for determining design loading conditions, such as pressure, temperature, and mechanical loads.	These requirements are subsumed by the HI-STORM FW FSAR, serving as the Design Specification, which establishes the service conditions and load combinations for the storage system.
MPC Enclosure Vessel	NB-4120	NB-4121.2 and NF-4121.2 provide requirements for repetition of tensile or impact tests for material subjected to heat treatment during fabrication or installation.	In-shop operations of short duration that apply heat to a component, such as plasma cutting of plate stock, welding, machining, and coating are not, unless explicitly stated by the Code, defined as heat treatment operations.

TABLE 3-1
List of ASME Code Alternatives for Multi-Purpose Canisters (MPCs)

MPC Closure Ring, Vent and Drain Cover Plate Welds	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	Root (if more than one weld pass is required) and final liquid penetrant examination to be performed in accordance with NB-5245. The closure ring provides independent redundant closure for vent and drain cover plates. Vent and drain port cover plate welds are helium leakage tested or the closure is made with redundant closures to eliminate helium leakage paths.
MPC Lid to Shell Weld	NB-5230	Radiographic (RT) or ultrasonic (UT) examination required.	Only progressive liquid penetrant (PT) examination is permitted. PT examination will include the root and final weld layers and each approx. 3/8" of weld depth.

3.0 DESIGN FEATURES (continued)

3.4 Site-Specific Parameters and Analyses

Site-specific parameters and analyses that will require verification by the system user are, as a minimum, as follows:

1. The temperature of 80º F is the maximum average yearly temperature. A Site's yearly average ambient temperature may be used for site-specific analysis.

2. The allowed temperature extremes, averaged over a 3-day period, shall be greater than -40º F and less than 125º F.

3. a. The resultant horizontal acceleration (vectorial sum of two horizontal Zero Period Accelerations (ZPAs) at a three-dimensional seismic site), a_H, and vertical ZPA, a_V, on the top surface of the ISFSI pad, expressed as fractions of a, shall satisfy the following inequalities:

$$a_H \leq f\ (1 - a_V);\ \text{and}$$

$$a_H \leq r\ (1 - a_V)\ /\ h$$

where f is the Coulomb friction coefficient for the cask/ISFSI pad interface, r is the radius of the cask, and h is the height of the cask center-of-gravity above the ISFSI pad surface. Unless demonstrated by appropriate testing that a higher coefficient of friction value is appropriate for a specific ISFSI, the value used shall be 0.53. If acceleration time-histories on the ISFSI pad surface are available, a_H and a_V may be the coincident values of the instantaneous net horizontal and vertical accelerations. If instantaneous accelerations are used, the inequalities shall be evaluated at each time step in the acceleration time history over the total duration of the seismic event.

If this static equilibrium based inequality cannot be met, a dynamic analysis of the cask/ISFSI pad assemblage with appropriate recognition of soil/structure interaction effects shall be performed to ensure that the casks will not tip over or undergo excessive sliding under the site's Design Basis Earthquake.