1.0 Definitions (continued)

FUEL DEBRIS	FUEL DEBRIS is ruptured fuel rods, severed rods, loose fuel pellets, containers or structures that are supporting these loose fuel assembly parts, or fuel assemblies with known or suspected defects which cannot be handled by normal means due to fuel cladding damage.
INTACT FUEL ASSEMBLY	INTACT FUEL ASSEMBLIES are fuel assemblies without known or suspected cladding defects greater than pinhole leaks or hairline cracks and which can be handled by normal means. Fuel assemblies without fuel rods in fuel rod locations shall not be classified as INTACT FUEL ASSEMBLIES unless dummy fuel rods are used to displace an amount of water greater than or equal to that displaced by the fuel rod(s).
LOADING OPERATIONS	LOADING OPERATIONS include all licensed activities on an OVERPACK or TRANSFER CASK while it is being loaded with fuel assemblies. LOADING OPERATIONS begin when the first fuel assembly is placed in the MPC and end when the OVERPACK or TRANSFER CASK is suspended from or secured on the transporter. LOADING OPERATIONS does not included MPC transfer between the TRANSFER CASK and the OVERPACK.
MINIMUM ENRICHMENT	MINIMUM ENRICHMENT is the minimum assembly average enrichment. Natural uranium blankets are not considered in determining minimum enrichment.
MULTI-PURPOSE CANISTER (MPC)	MPCs are the sealed spent nuclear fuel canisters which consist of a honeycombed fuel basket contained in a cylindrical canister shell which is welded to a baseplate, lid with welded port cover plates, and closure ring. The MPC provides the confinement boundary for the contained radioactive materials.
NON-FUEL HARDWARE	NON-FUEL HARDWARE is defined as Burnable Poison Rod Assemblies (BPRAs), Thimble Plug Devices (TPDs), Control Rod Assemblies (CRAs), Axial Power Shaping Rods (APSRs), Wet Annular Burnable Absorbers (WABAs), Rod Cluster Control Assemblies (RCCAs), Control Element Assemblies (CEAs) Neutron Source Assemblies (NSAs), water displacement guide tube plugs, orifice rod assemblies, instrument tube tie rods (ITTRs), and vibration suppressor inserts, and components of these devices such as individual rods.

(continued)

Table 2.1-1 (page 2 of 24)
Fuel Assembly Limits

I. MPC MODEL: MPC-24 (continued)

A. Allowable Contents (continued)

d.	Decay Heat Per Fuel Storage Location:	
	i. Array/Classes 14x14D, 14x14E, and 15x15G	$\leq$ 710 Watts
	ii. All Other Array/Classes	As specified in Section 2.4.
e.	Fuel Assembly Length:	$\leq$ 176.8 inches (nominal design)
f.	Fuel Assembly Width:	$\leq$ 8.54 inches (nominal design)
g.	Fuel Assembly Weight:	$\leq$ 1,720 lbs (including NON-FUEL HARDWARE) for assemblies that do not require fuel spacers, otherwise $\leq$ 1,680 lbs (including NON-FUEL HARDWARE)

B. Quantity per MPC: Up to 24 fuel assemblies.

C. Deleted.

D. DAMAGED FUEL ASSEMBLIES and FUEL DEBRIS are not authorized for loading into the MPC-24.

E. One NSA is authorized for loading into the MPC-24.

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 or NSAs, may only be loaded in fuel storage locations 9, 10, 15, and/or 16. Fuel assemblies containing CRAs, RCCAs, or CEAs may only be stored in fuel storage locations 4, 5, 8-11, 14-17, 20, and/or 21 See Figure 2.1-1). These requirements are in addition to any other requirements specified for uniform or regionalized fuel loading.

Table 2.1-1 (page 11 of 24)
Fuel Assembly Limits

III. MPC MODEL: MPC-68 and MPC-68FF

A. Allowable Contents

1. Uranium oxide or MOX BWR INTACT FUEL ASSEMBLIES listed in table 2.1-3, with or without channels and meeting the following specifications:

a. Cladding Type:	ZR or Stainless Steel (SS) as specified in Table 2.1-3 for the applicable fuel assembly array/class.
b Maximum PLANAR-AVERAGE INITIAL ENRICHMENT:	As specified in Table 2.1-3 for the applicable fuel assembly array/class.
c. Initial Maximum Rod Enrichment:	As specified in Table 2.1-3 for the applicable fuel assembly array/class.
d. Post-irradiation Cooling Time and Average Burnup Per Assembly:	
i. Array/Classes 6X6A, 6X6B, 6X6C, 7X7A, 8X8A	Cooling time $\geq$ 18 years and an average burnup $\leq$ 30,000 MWD/MTU (or MWD/MTIHM)
ii. Array/Class 8X8F	Cooling time $\geq$ 10 years and an average burnup $\leq$ 27,500 MWD/MTU
iii. Array/Classes 10X10D and 10X10E	Cooling time $\geq$ 10 years and an average burnup $\leq$ 27,500 MWD/MTU
iv. All Other Array/Classes	As specified in Section 2.4

Table 2.1-1 (page 12 of 24)
Fuel Assembly Limits

III. MPC MODEL: MPC-68FF (continued)

A. Allowable Contents (continued)

e. Decay Heat Per Assembly

i. Array/Classes 6X6A, 6X6B, 6X6C, 7X7A, 8X8A	≤ 115 Watts
ii. Array/Class 8X8F	≤ 183.5 Watts
iii. Array/Classes 10X10D and 10X10E	≤ 95 Watts
iv. All Other Array/Classes	As specified in Section 2.4

f. Fuel Assembly Length:

i. Array/Classes 6X6A, 6X6B, 6X6C, 7X7A, 8X8A	≤ 135.0 inches (nominal design)
ii. All Other Array/Classes	≤ 176.5 inches (nominal design)

g. Fuel Assembly Width:

i. Array/Classes 6X6A, 6X6B, 6X6C, 7X7A, 8X8A	≤ 4.70 inches (nominal design)
ii. All Other Array/Classes	≤ 5.85 inches (nominal design)

h. Fuel Assembly Weight:

i. Array/Classes 6X6A, 6X6B, 6X6C, 7X7A, 8X8A	≤ 550 lbs, including channels
ii. All Other Array/Classes	≤ 730 lbs, including channels

Table 2.1-1 (page 18 of 24)
Fuel Assembly Limits

IV MPC MODEL: MPC-24E and 24EF (continued)

A. Allowable Contents (continued)

d. Decay Heat Per Fuel Storage Location:	
i. Array/Classes 14x14D, 14x14E, and 15x15G	$\leq$ 710 Watts
ii. All Other Array/Classes	As specified in Section 2.4.
e. Fuel Assembly Length:	$\leq$ 176.8 inches (nominal design)
f. Fuel Assembly Width:	$\leq$ 8.54 inches (nominal design)
g. Fuel Assembly Weight:	$\leq$ 1,720 lbs (including NON-FUEL HARDWARE) for assemblies that do not require fuel spacers, otherwise $\leq$ 1,680 lbs (including NON-FUEL HARDWARE)

Table 2.1-1 (page 20 of 24)
Fuel Assembly Limits

IV MPC MODEL: MPC-24E and 24EF (continued)

A. Allowable Contents (continued)

d.	Decay Heat Per Fuel Storage Location:	
	i. Array/Classes 14x14D, 14x14E, and 15x15G	≤ 710 Watts
	ii. All Other Array/Classes	As specified in Section 2.4.
e.	Fuel Assembly Length:	≤ 176.8 inches (nominal design)
f.	Fuel Assembly Width:	≤ 8.54 inches (nominal design)
g.	Fuel Assembly Weight:	≤ 1,720 lbs (including NON-FUEL HARDWARE and DFC) for assemblies that do not require fuel spacers, otherwise ≤ 1,680 lbs (including NON-FUEL HARDWARE and DFC)

B. Quantity per MPC: Up to four(4) DAMAGED FUEL ASSEMBLIES and/or FUEL DEBRIS in DAMAGED FUEL CONTAINERS, stored in fuel storage locations 3, 6,19, and/or 22. The remaining fuel storage locations may be filled with PWR INTACT FUEL ASSEMBLIES meeting the applicable specifications.

C. One NSA is permitted for loading.

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 or NSAs, may only be loaded in fuel storage locations 9, 10, 15, and/or 16 (see Figure 2.1-2). Fuel assemblies containing CRAs, RCCAs, or CEAs may only be stored in fuel storage locations 4, 5, 8-11, 14-17, 20, and/or 21 (see Figure F.1-2). These requirements are in addition to any other requirements specified for uniform or regionalized fuel loading.

Table 2.1-1 (page 22 of 24)
Fuel Assembly Limits

V. MPC MODEL: MPC-32 and MPC-32F (continued)

A. Allowable Contents (continued)

d. Decay Heat Per Fuel Storage Location:	
i. Array/Classes 14x14D, 14x14E, and 15x15G	$\leq$ 500 Watts
ii. All Other Array/Classes	As specified in Section 2.4.
e. Fuel Assembly Length	$\leq$ 176.8 inches (nominal design)
f. Fuel Assembly Width	$\leq$ 8.54 inches (nominal design)
g. Fuel Assembly Weight	$\leq$ 1,720 lbs (including NON-FUEL HARDWARE) for assemblies that do not requre fuel spacers, otherwise $\leq$ 1,680 lbs (including NON-FUEL HARDWARE)

Table 2.1-1 (page 24 of 24)
Fuel Assembly Limits

V. MPC MODEL: MPC-32 and MPC-32F (cont'd)

A. Allowable Contents (continued)

d.	Decay Heat Per Fuel Storage Location:	
	i. Array/Classes 14x14D, 14X14E, and 15x15G	≤ 500 Watts
	ii. All Other Array/Classes	As specified in Section 2.4.
e.	Fuel Assembly Length	≤ 176.8 inches (nominal design)
f.	Fuel Assembly Width	≤ 8.54 inches (nominal design)
g.	Fuel Assembly Weight	≤ 1,720 lbs (including NON-FUEL HARDWARE and DFC) for assemblies that do not require fuel spacers, otherwise ≤ 1,680 lbs (including NON-FUEL HARDWARE and DFC)

B. Quantity per MPC: Up to eight (8) DAMAGED FUEL ASSEMBLIES and/or FUEL DEBRIS in DAMAGED FUEL CONTAINERS, stored in fuel storage locations 1, 4, 5, 10, 23, 28, 29, and/or 32. The remaining fuel storage locations may be filled with PWR INTACT FUEL ASSEMBLIES meeting the applicable specifications.

C. One NSA is authorized for loading.

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 NSAs, may only be loaded in fuel storage locations 13, 14, 19, and/or 20 (see Figure 2.1-3). Fuel assemblies containing CRAs, RCCAs, CEAs or APSRs may only be stored in fuel storage locations 7, 8, 12-15, 18-21, 25 and/or 26. (See Figure 2.1-3). These requirements are in addition to any other requirements specified for uniform or regionalized fuel loading.

Table 2.1-8
NON-FUEL HARDWARE COOLING AND AVERAGE BURNUP (Notes 1, 2, 3, and 8)

Post-irradiation Cooling Time (years)	**INSERTS** (Note 4) **BURNUP (MWD/MTU)**	**NSA or GUIDE TUBE HARDWARE** (Note 5) **BURNUP (MWD/MTU)**	**CONTROL COMPONENT** (Note 6) **BURNUP (MWD/MTU)**	**APSR BURNUP (MWD/MTU)**
≥ 3	≤ 24,635	NA (Note 7)	NA	NA
≥ 4	≤ 30,000	≤ 20,000	NA	NA
≥ 5	≤ 36,748	≤ 25,000	≤ 630,000	≤ 45,000
≥ 6	≤ 44,102	≤ 30,000	-	≤ 54,500
≥ 7	≤ 52,900	≤ 40,000	-	≤ 68,000
≥ 8	≤ 60,000	≤ 45,000	-	≤ 83,000
≥ 9	-	≤ 50,000	-	≤ 111,000
≥ 10	-	≤ 60,000	-	≤ 180,000
≥ 11	-	≤ 75,000	-	≤ 630,000
≥ 12	-	≤ 90,000	-	-
≥ 13	-	≤ 180,000	-	-
≥ 14	-	≤ 630,000	-	-

Notes:
1. Burnups for NON-FUEL HARDWARE are to be determined based on the burnup and uranium mass of the fuel assemblies in which the component was inserted during reactor operation.
2. Linear interpolation between points is permitted, except that NSA or Guide Tube Hardware and APSR burnups > 180,000 MWD/MTU and ≤ 630,000 MWD/MTU must be cooled ≥ 14 years and ≥ 11 years, respectively.
3. Applicable to uniform loading and regionalized loading.
4. Includes Burnable Poison Rod Assemblies (BPRAs), Wet Annular Burnable Absorbers (WABAs), and vibration suppressor inserts..
5. Includes Thimble Plug Devices (TPDs), water displacement guide tube plugs, and orifice rod assemblies.
6. Includes Control Rod Assemblies (CRAs), Control Element Assemblies (CEAs), and Rod Cluster Control Assemblies (RCCAs).
7. NA means not authorized for loading at this cooling time.
8. Non-Fuel hardware burnup and cooling times are not applicable to ITTRs since they are installed post-irradiation.