ATTACHMENT III

FARLEY NUCLEAR PLANT

TECHNICAL SPECIFICATIONS CHANGE REQUEST

SPENT FUEL POOL SOLUBLE BORON CREDIT

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FNP Unit 1

Technical Specifications

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

SECTION | PAGE

3/4.7 PLANT SYSTEMS

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.7.13 FUEL STORAGE POOL BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.7.13 The fuel storage pool boron concentration shall be greater than or equal to 2000 ppm.

APPLICABILITY: When fuel assemblies are stored in the fuel storage pool.

ACTION:

With the fuel storage pool boron concentration less than 2000 ppm, immediately suspend movement of fuel assemblies in the fuel storage pool, and initiate action to restore the fuel storage pool boron concentration to within its limit. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.13 The boron concentration of the fuel storage pool shall be determined to be within the limit at least once per 7 days.

3/4.7.14 FUEL ASSEMBLY STORAGE

LIMITING CONDITION FOR OPERATION

3.7.14 The combination of initial enrichment and burnup of each fuel assembly stored in the spent fuel storage pool shall be within the Acceptable Burnup Domain of Figure 3.7-1, or shall be stored in accordance with Specification 5.6.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the spent fuel storage pool.

ACTION:

With the requirements of the above specification not satisfied, initiate action to move the noncomplying fuel assembly to an acceptable storage location. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.14 The combination of initial enrichment and burnup of each fuel assembly shall be verified to be in accordance with Figure 3.7-1 or Specification 5.6.1.1 within 7 days following the relocation or addition of fuel assemblies to the spent fuel storage pool.

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. K_{eff} less than 1.0 when flooded with unborated water, which includes conservative allowances for uncertainties.

b. K_{eff} less than or equal to 0.95 when flooded with water borated to 400 ppm, which includes conservative allowances for uncertainties and biases.

c. A nominal 10.75 inch center-to-center distance between fuel assemblies placed in the storage racks.

d. A maximum nominal enrichment of 5.0 w/o U-235.

e. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "acceptable range" of Figure 3.7-1 may be allowed unrestricted storage in the spent fuel racks (also shown as the All Cell Storage configuration in Figure 5.6-2).

f. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "unacceptable range" of Figure 3.7-1 will be stored in compliance with Figures 5.6-1 through 5.6-5. The high enrichment fuel assemblies shown in the Burned/Fresh Storage configuration in Figure 5.6-2, with maximum nominal enrichments greater than 3.9 w/o U-235, shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly k_{∞} less than or equal to 1.455 at 68°F is maintained.

g. Damaged fuel assemblies F02, F05, F06, F15, F17, F18, F19, F20, F30, F31, and F32 shall be stored in accordance with Figure 5.6-6.

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with:

a. K_{eff} less than or equal to 0.98, assuming aqueous foam moderation.

b. A nominal 21 inch center-to-center distance between new fuel assemblies placed in the storage racks.

c. A maximum nominal enrichment of:

1. 4.25 weight percent U-235 for Westinghouse fuel assemblies with Standard Fuel Assembly fuel rod diameter.

2. 5.0 weight percent U-235 for Westinghouse fuel assemblies with Optimized Fuel Assembly fuel rod diameter. Westinghouse fuel with Optimized Fuel Assembly fuel rod diameter and maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly K_{∞} less than or equal to 1.455 at 68°F is maintained.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 149.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1407 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

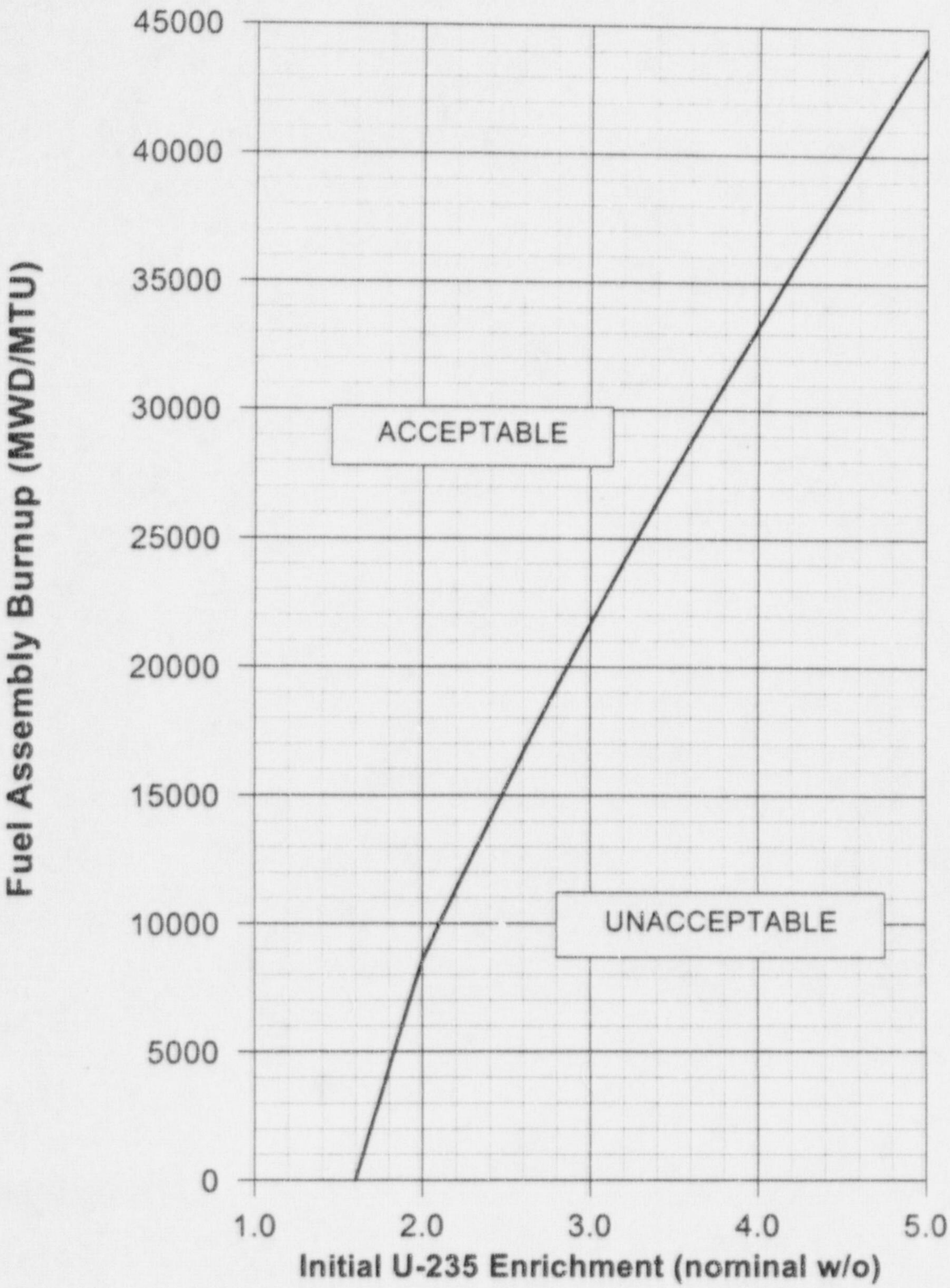
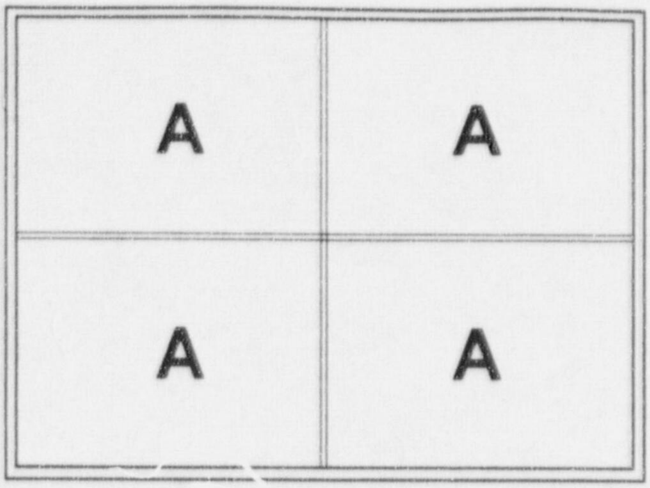
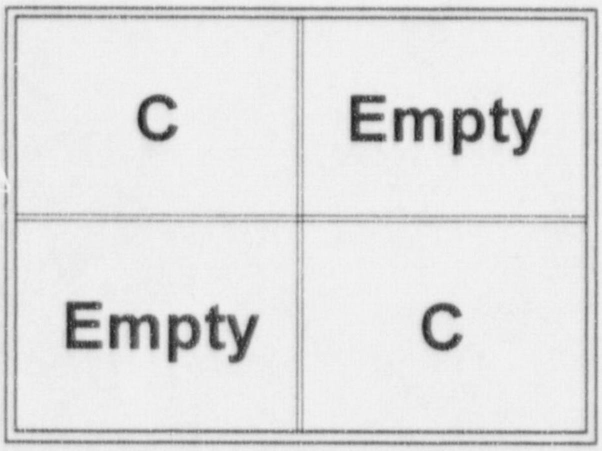


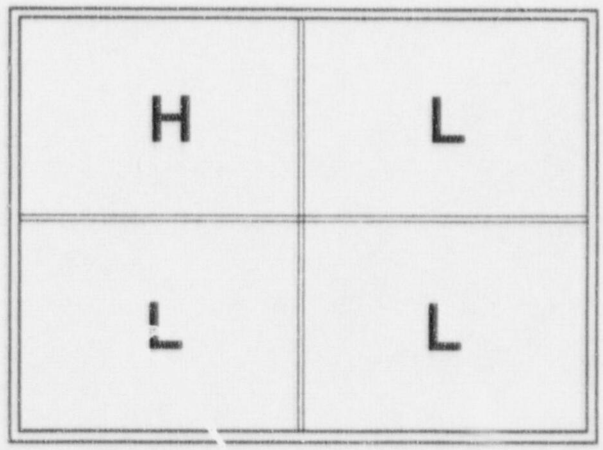
Figure 5.6-1 Fuel Assembly Burnup Limit Requirements for Low Enrichment (L) Assembly of the Burned/Fresh Checkerboard Storage (see Figure 5.6-2)



All Cell Storage



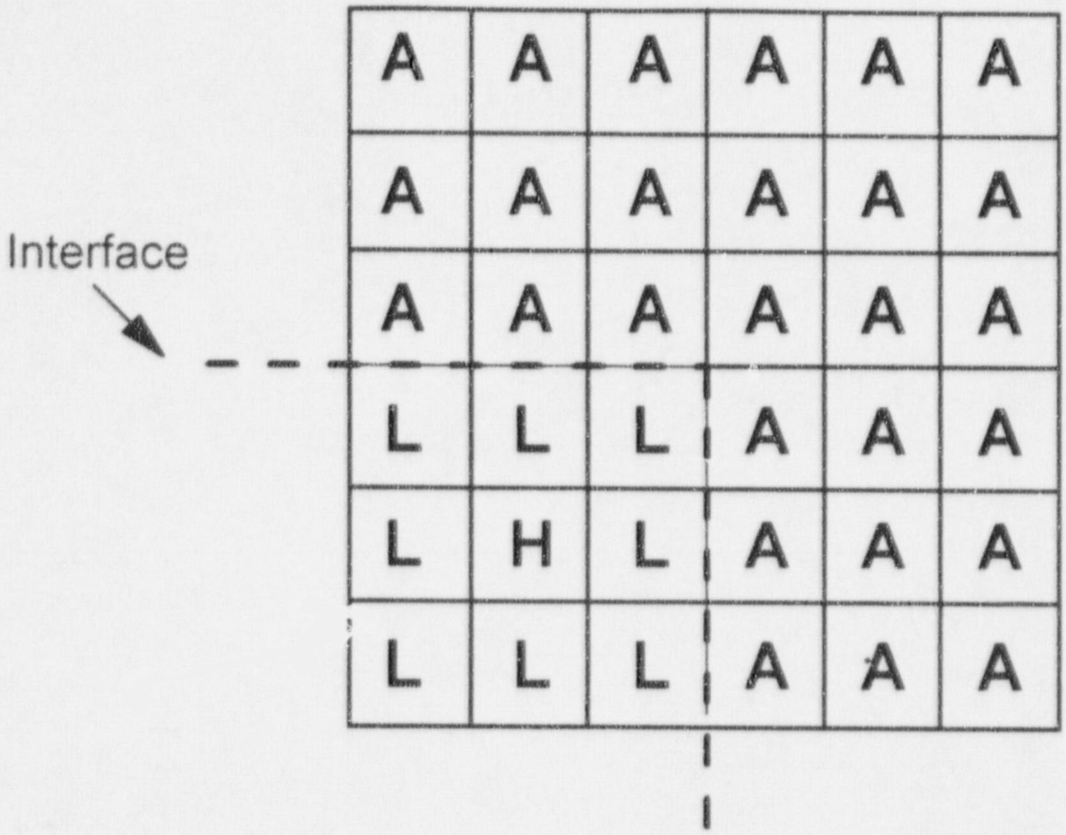
2-out-of-4 Storage



Burned/Fresh Storage

Note:
A = All Cell Enrichment (Figure 3.7-1)
C = 2-out-of-4 Enrichment (No restriction on enrichment or burnup)
L = Low Enrichment of Burned/Fresh (Figure 5.6-1)
H = High Enrichment of Burned/Fresh (See section 5.6.1.1.f for IFBA requirement)
Empty = Empty Cell

Figure 5.6-2 Spent Fuel Storage Configurations



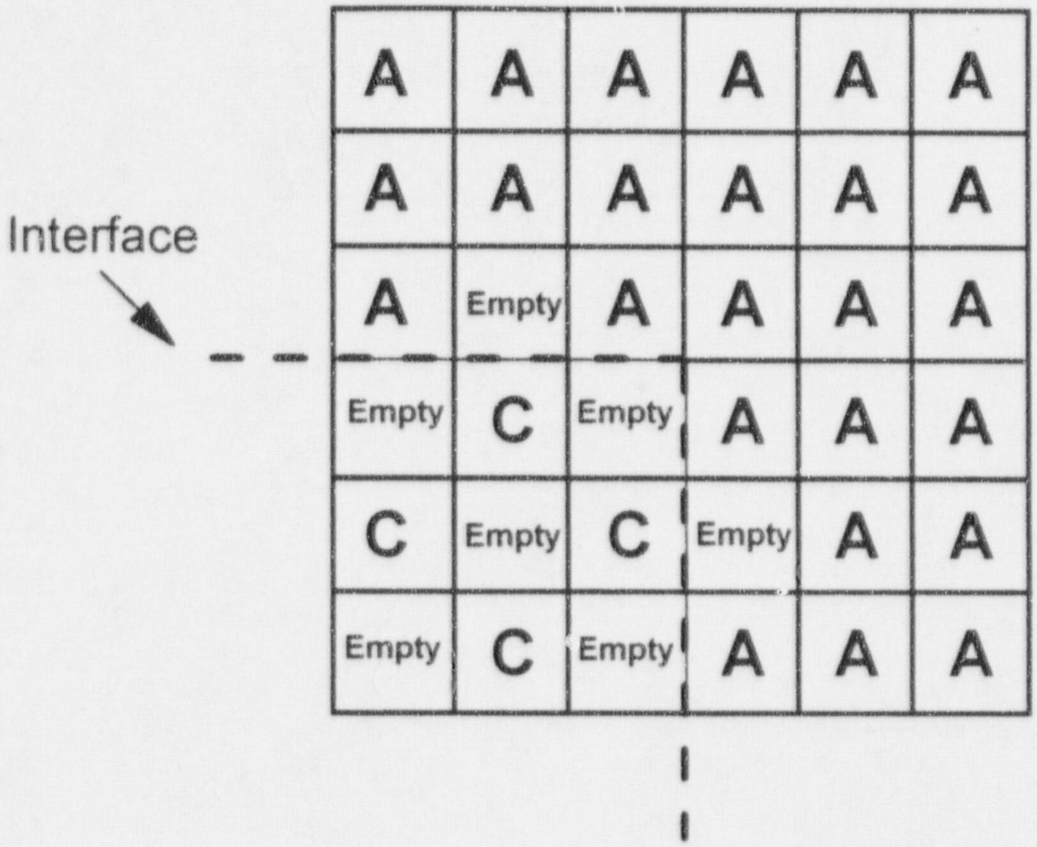
Note:
A = All Cell Enrichment
L = Low Enrichment of Burned/Fresh
H = High Enrichment of Burned/Fresh

Boundary Between All Cell Storage and Burned/Fresh Storage

Note:

1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-3 Interface Requirements



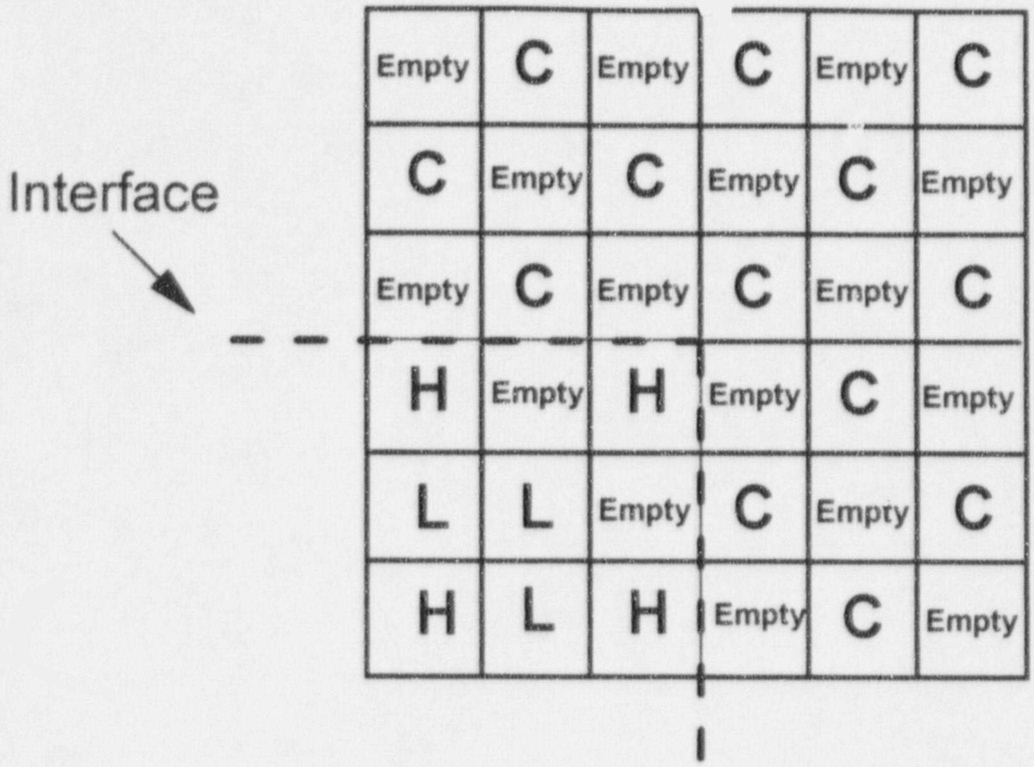
Note:
A = All Cell Enrichment
C = 2-Out-Of-4 Enrichment
Empty = Empty Cell

Boundary Between All Cell Storage and 2-out-of-4 Storage

Note:

1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace as assembly with an empty cell.

Figure 5.6-4 Interface Requirements



Note:

C	=	2-Out-Of-4 Enrichment
L	=	Low Enrichment of Burned/Fresh
H	=	High Enrichment of Burned/Fresh
Empty	=	Empty Cell

Boundary Between 2-out-of-4 Storage and Burned/Fresh Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-5 Interface Requirements

	F31	Empty	F30	F06	
	F18	F17	F19	F02	
	F15	F20	F05	F32	
				Water	

Note: All Assemblies are 3.0 w/c ^{235}U nominal enrichment

Figure 5.6-6 Damaged Fuel Assembly Configuration

3/4.7.12 FIRE BARRIER PENETRATIONS

This specification deleted.

3/4.7.13 & 3/4.7.14 FUEL STORAGE POOL BORON CONCENTRATION & FUEL ASSEMBLY STORAGE

The spent fuel storage racks contain storage locations for 1407 fuel assemblies. The spent fuel racks have been analyzed in accordance with the methodology contained in WCAP-14416-NP-A, Westinghouse Spent Fuel Rack Criticality Analysis Methodology", Revision 1, November, 1996. This methodology ensures that the spent fuel rack multiplication factor, k_{eff} is less than 0.95, as recommended by ANSI 57.2-1983 and the guidance contained in NRC Letter to All Power Reactor Licensees from B. K. Grimes, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", April 14, 1978. The codes, methods, and techniques contained in the methodology are used to satisfy this k_{eff} criterion. The spent fuel storage racks are analyzed to allow storage of all Westinghouse 17X17 fuel assemblies with nominal enrichments up to 5.0 w/o U-235 utilizing credit for checkerboard configurations, burnup, Integral Fuel Burnable Absorbers, and soluble boron, to ensure that k_{eff} is maintained $\leq$ 0.95, including uncertainties, tolerances, and accident conditions. In addition, the spent fuel pool k_{eff} is maintained < 1.0 including uncertainties and tolerances on a 95/95 basis without soluble boron.

The soluble boron concentration required to maintain $k_{eff} \leq 0.95$ under normal conditions is 400 ppm.

The following storage configurations and enrichment limits were evaluated in the spent fuel rack criticality analysis:

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal 2.15 w/o U-235 can be stored in any cell location as shown in Figure 5.6-2. Fuel assemblies with initial nominal enrichments greater than these limits must satisfy a minimum burnup requirement as shown in Figure 3.7-1.

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal to 5.0 w/o U-235 can be stored in a 2 out of 4 checkerboard arrangement as shown in Figure 5.6-2. In the 2 out of 4 checkerboard storage arrangement, 2 fuel assemblies can be stored corner adjacent with 2 empty storage cells.

Westinghouse 17X17 fuel assemblies can be stored in a burned/fresh checkerboard arrangement of a 2X2 matrix of storage cells as shown in Figure 5.6-2. In the burned/fresh 2X2 checkerboard arrangement, three of the fuel assemblies must have an initial nominal enrichment less than or equal to 1.6 w/o U-235, or satisfy a minimum burnup requirement for higher initial enrichments as shown in Figure 5.6-1. The fourth fuel assembly must have an initial nominal enrichment less than or equal to 3.9 w/o U-235, or satisfy a minimum Integral Fuel Burnable Absorber requirement for higher initial enrichments to maintain the reference fuel assembly k_{∞} less than or equal to 1.455 at 68 ^{o}F.

Eleven damaged Westinghouse 17X17 fuel assemblies can be stored in a 12 storage cell configuration surrounded by empty cells as shown in Figure 5.6-6. The eleven fuel assemblies contain a nominal enrichment of 3.0 w/o U-235.

Specifications 3.7.14 and 5.6.1.1 ensure that fuel assemblies are stored in the spent fuel racks in accordance with the configurations assumed in the spent fuel rack criticality analysis.

The most limiting accident with respect to the storage configurations assumed in the spent fuel rack criticality analysis is the misplacement of a 5.0 w/o U-235 fuel assembly into an empty storage cell location in the 2 out of 4 checkerboard storage arrangement. The amount of soluble boron required to maintain k_{eff} less than 0.95 due to this fuel misload accident is 850 ppm. The 2000 ppm limit specified in the LCO is consistent with the normal boron concentration maintained in the spent fuel pool, and bounds the 850 ppm required for a fuel misload accident.

Specification 5.6.1.1 b. requires that a boron concentration of 400 ppm in the spent fuel pool will maintain $k_{eff} \leq 0.95$. A spent fuel pool boron dilution analysis was performed to determine that sufficient time is available to detect and mitigate dilution of the spent fuel pool prior to exceeding the k_{eff} design basis limit of 0.95. The spent fuel pool boron dilution analysis concluded that an inadvertent or unplanned event that would result in a dilution of the spent fuel pool boron concentration from 2000 ppm to 400 ppm is not a credible event.

FNP Unit 1 Technical Specifications Marked-Up Pages

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

Insert 1

BASES

SECTION

Insert 1

Insert 2

3/4.7.13 FUEL STORAGE POOL BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.7.13 The fuel storage pool boron concentration shall be greater than or equal to 2000 ppm.

APPLICABILITY: When fuel assemblies are stored in the fuel storage pool.

ACTION:

With the fuel storage pool boron concentration less than 2000 ppm, immediately suspend movement of fuel assemblies in the fuel storage pool, and initiate action to restore the fuel storage pool boron concentration to within its limit. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.13 The boron concentration of the fuel storage pool shall be determined to be within the limit at least once per 7 days.

3/4.7.14 FUEL ASSEMBLY STORAGE

LIMITING CONDITION FOR OPERATION

3.7.14 The combination of initial enrichment and burnup of each fuel assembly stored in the spent fuel storage pool shall be within the Acceptable Burnup Domain of Figure 3.7-1, or shall be stored in accordance with Specification 5.6.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the spent fuel storage pool.

ACTION:

With the requirements of the above specification not satisfied, initiate action to move the noncomplying fuel assembly to an acceptable storage location. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.14 The combination of initial enrichment and burnup of each fuel assembly shall be verified to be in accordance with Figure 3.7-1 or Specification 5.6.1.1 within 7 days following the relocation or addition of fuel assemblies to the spent fuel storage pool.

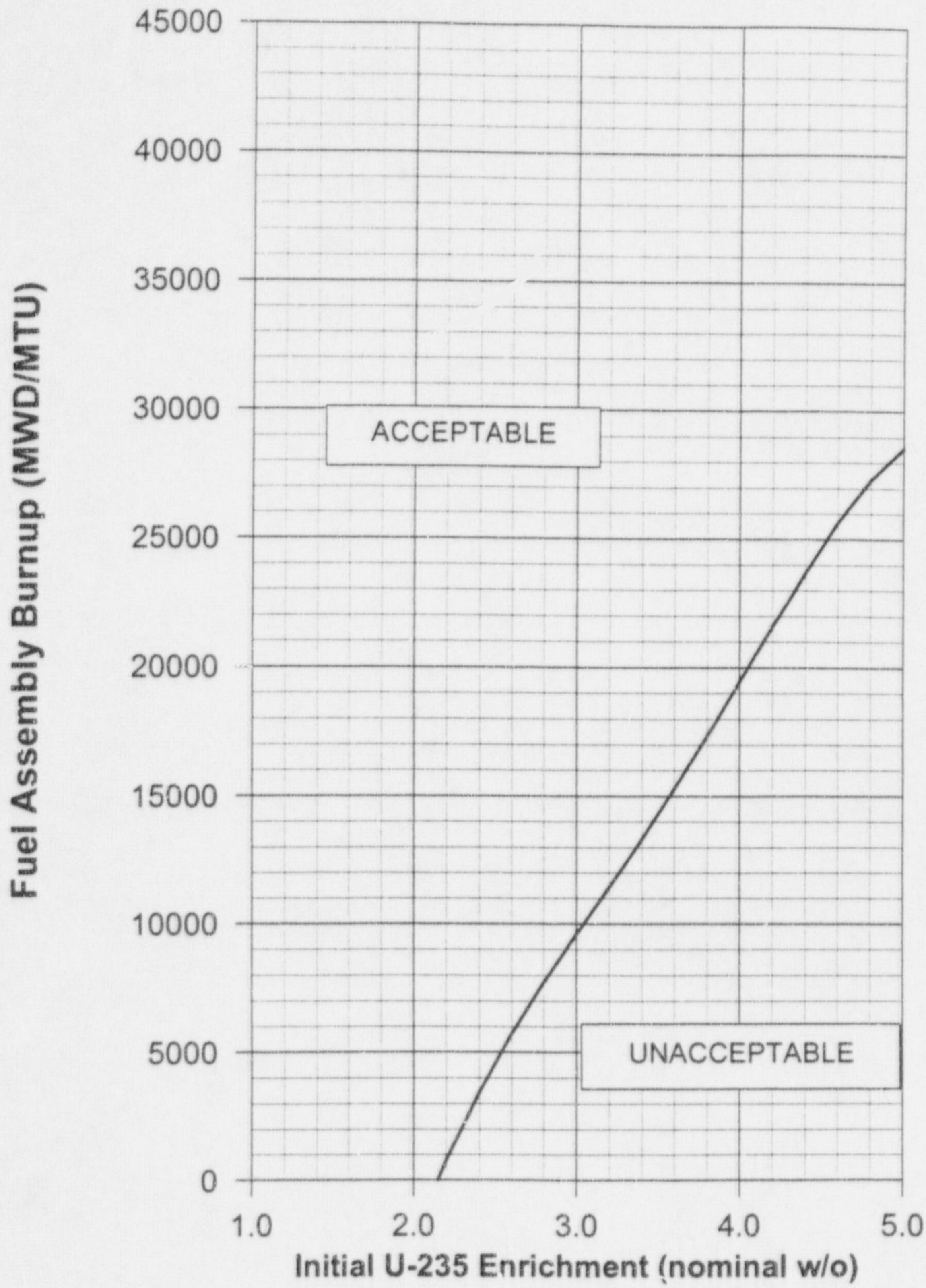


Figure 3.7-1 Fuel Assembly Burnup Limit Requirements For All Cell Storage

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

Insert 3

b. a. K_{eff} less than or equal to 0.95 when flooded with unborated water borated to 400 ppm, which includes conservative allowances for uncertainties and biases.

c. b. A nominal 10.75 inch center-to-center distance between fuel assemblies placed in the storage racks.

d. c. A maximum nominal enrichment of: 5.0 w/o U-235.

1. 4.25 weight percent U-235 for Westinghouse LOPAR fuel assemblies.
2. 5.0 weight percent U-235 for Westinghouse OFA or VANTAGE-5 fuel assemblies. Westinghouse OFA and VANTAGE-5 fuel with maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly K_{∞} less than or equal to 1.455 at 68°F is maintained.

Insert 4

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with:

a. K_{eff} less than or equal to 0.98, assuming aqueous foam moderation.

b. A nominal 21 inch center-to-center distance between new fuel assemblies placed in the storage racks.

c. A maximum nominal enrichment of:

1. 4.25 weight percent U-235 for Westinghouse LOPAR fuel assemblies, with Standard Fuel Assembly fuel rod diameter.
2. 5.0 weight percent U-235 for Westinghouse OFA or VANTAGE-5 fuel assemblies with Optimized Fuel Assembly fuel rod diameter. Westinghouse OFA and VANTAGE-5 and fuel with maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly K_{∞} less than or equal to 1.455 at 68°F is maintained.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 149.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1407 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

Insert 3

a. k_{eff} less than 1.0 when flooded with unborated water, which includes conservative allowances for uncertainties.

Insert 4

e. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "acceptable range" of Figure 3.7-1 may be allowed unrestricted storage in the spent fuel racks (also shown as the All Cell Storage configuration in Figure 5.6-2).

f. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "unacceptable range" of Figure 3.7-1 will be stored in compliance with Figures 5.6-1 through 5.6-5. The high enrichment fuel assemblies shown in the Burned/Fresh Storage configuration in Figure 5.6-2, with maximum nominal enrichments greater than 3.9 w/o U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly k_{∞} less than or equal to 1.455 at 68° F is maintained.

g. Damaged fuel assemblies F02, F05, F06, F15, F17, F18, F19, F20, F30, F31, and F32 shall be stored in accordance with Figure 5.6-6.

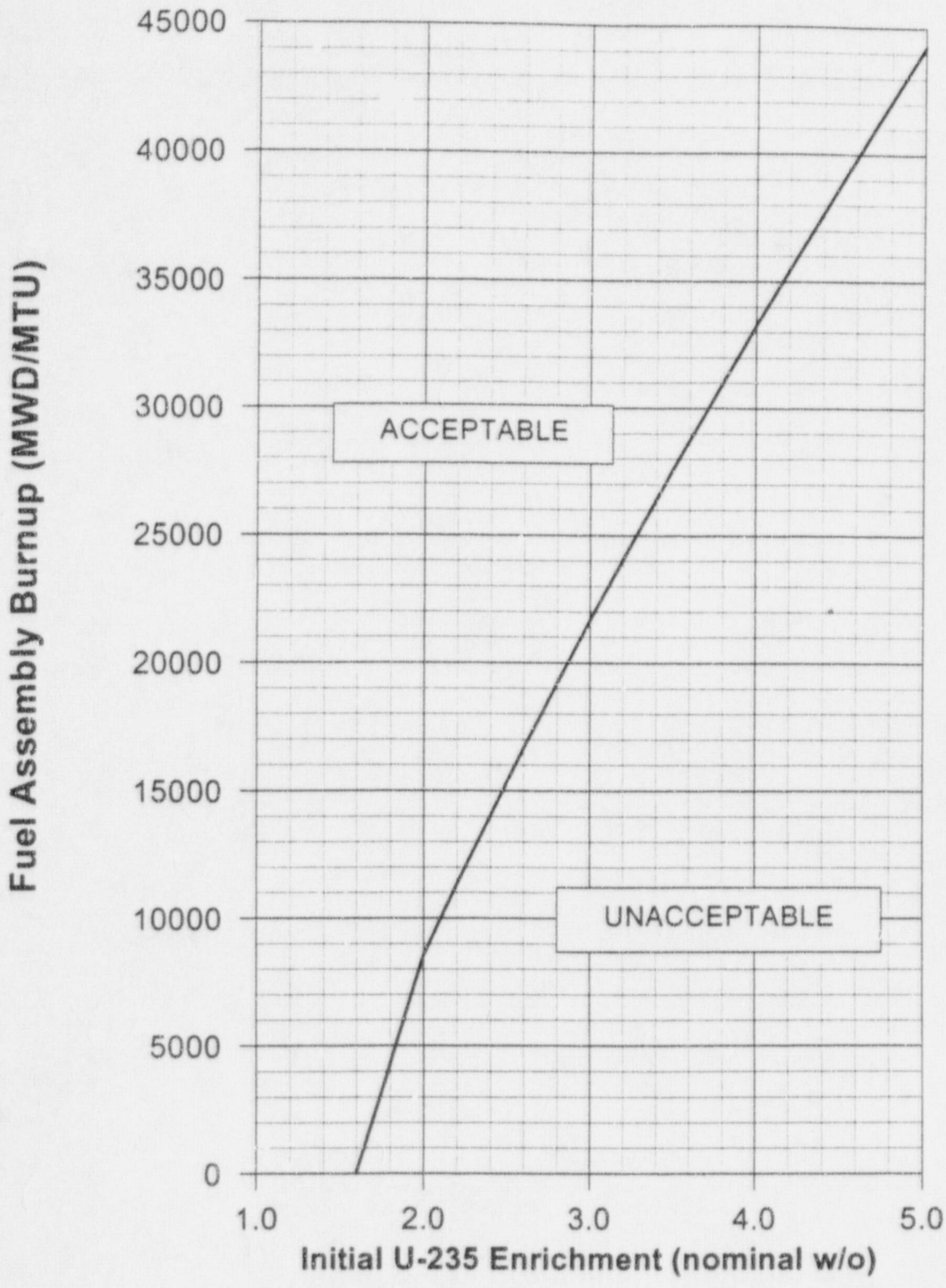
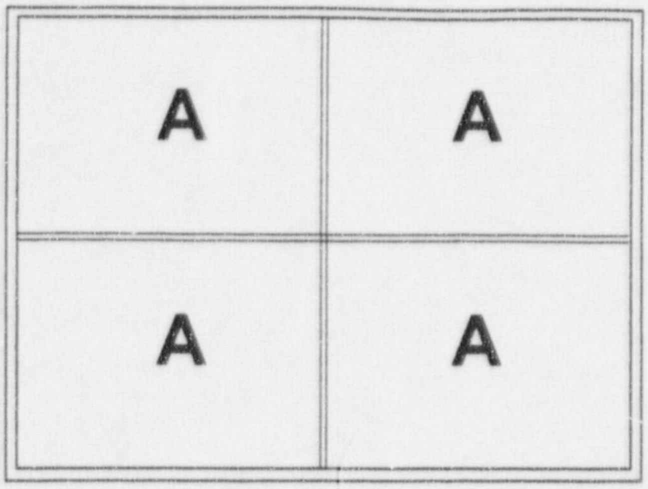
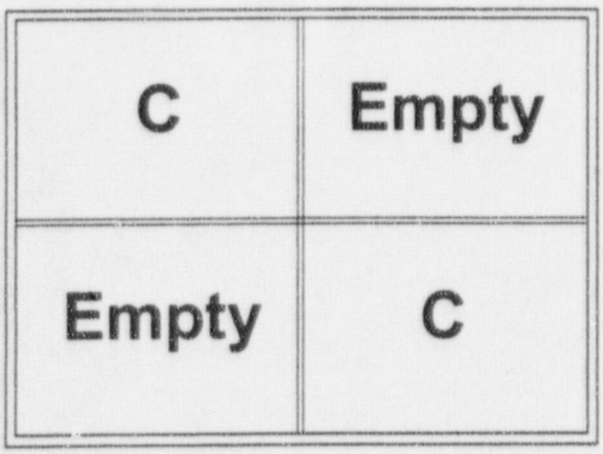


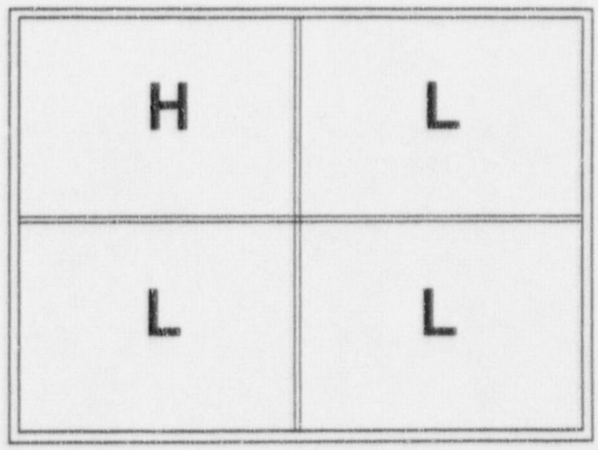
Figure 5.6-1 Fuel Assembly Burnup Limit Requirements for Low Enrichment (L) Assembly of the Burned/Fresh Checkerboard Storage (see Figure 5.6-2)



All Cell Storage



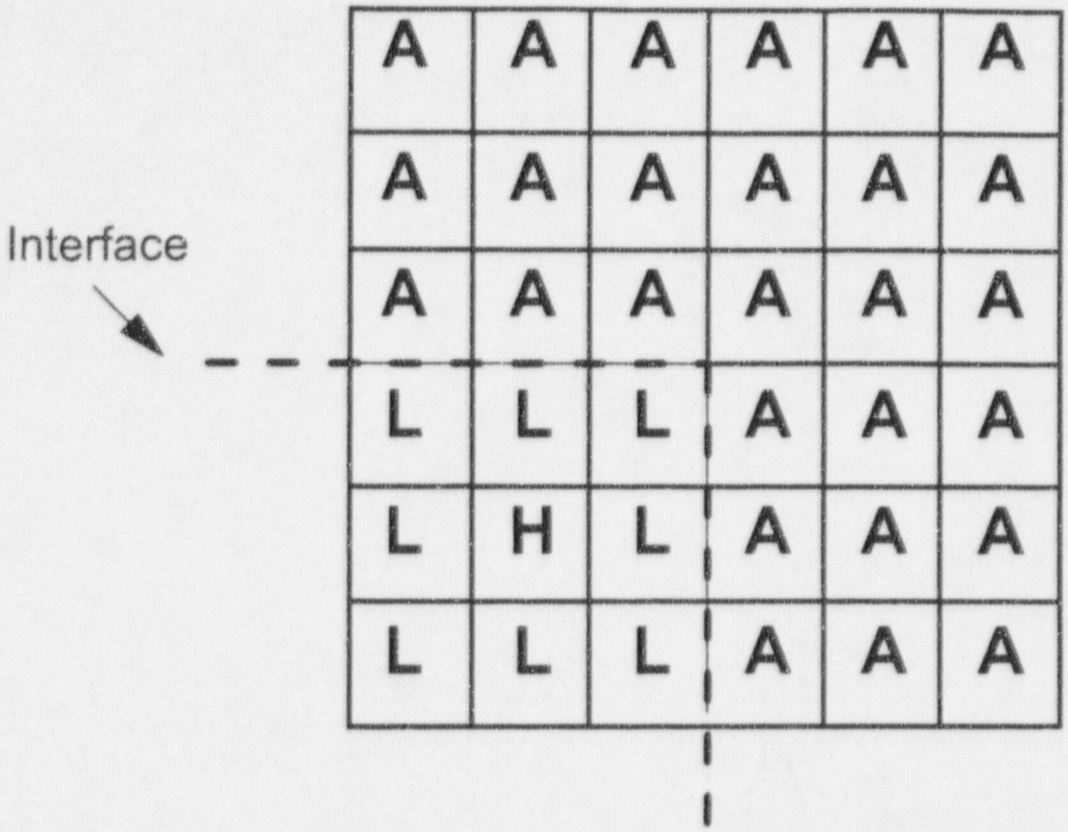
2-out-of-4 Storage



Burned/Fresh Storage

Note:
A = All Cell Enrichment (Figure 3.7-1)
C = 2-out-of-4 Enrichment (No restriction on enrichment or burnup)
L = Low Enrichment of Burned/Fresh (Figure 5.6-1)
H = High Enrichment of Burned/Fresh (See section 5.6.1.1.f for IFBA requirement)
Empty = Empty Cell

Figure 5.6-2 Spent Fuel Storage Configurations

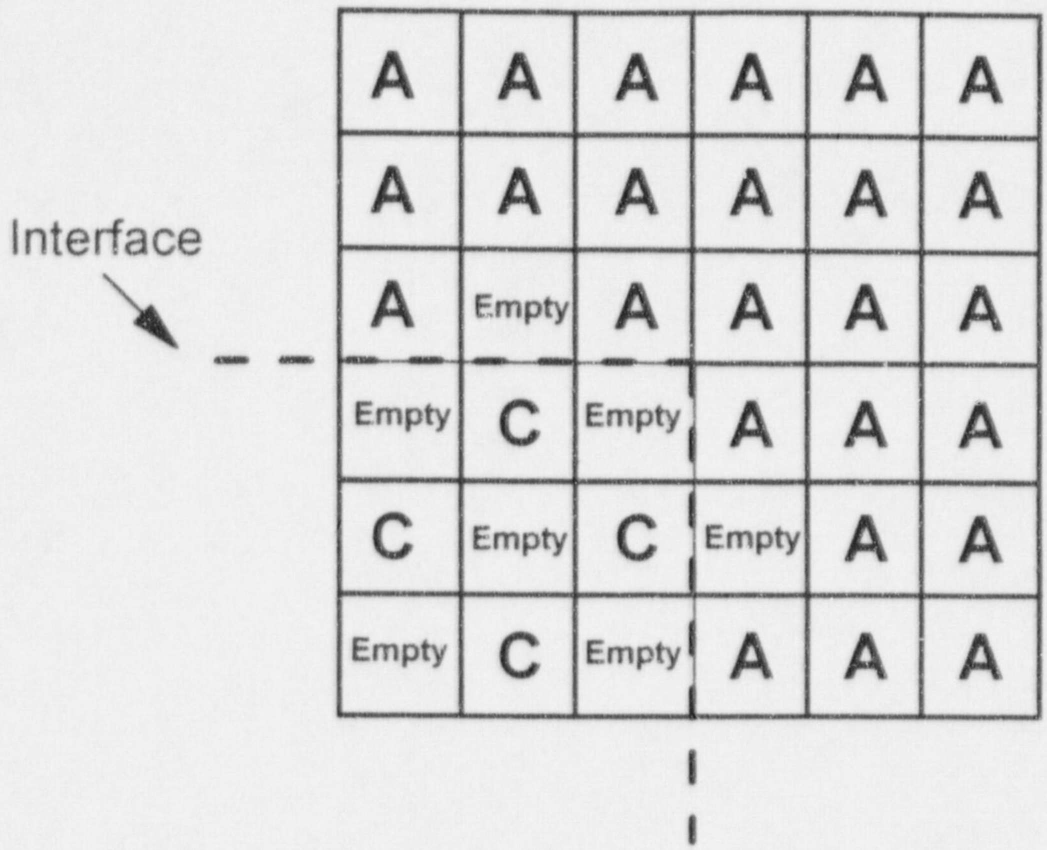


Note:
A = All Cell Enrichment
L = Low Enrichment of Burned/Fresh
H = High Enrichment of Burned/Fresh

Boundary Between All Cell Storage and Burned/Fresh Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-3 Interface Requirements

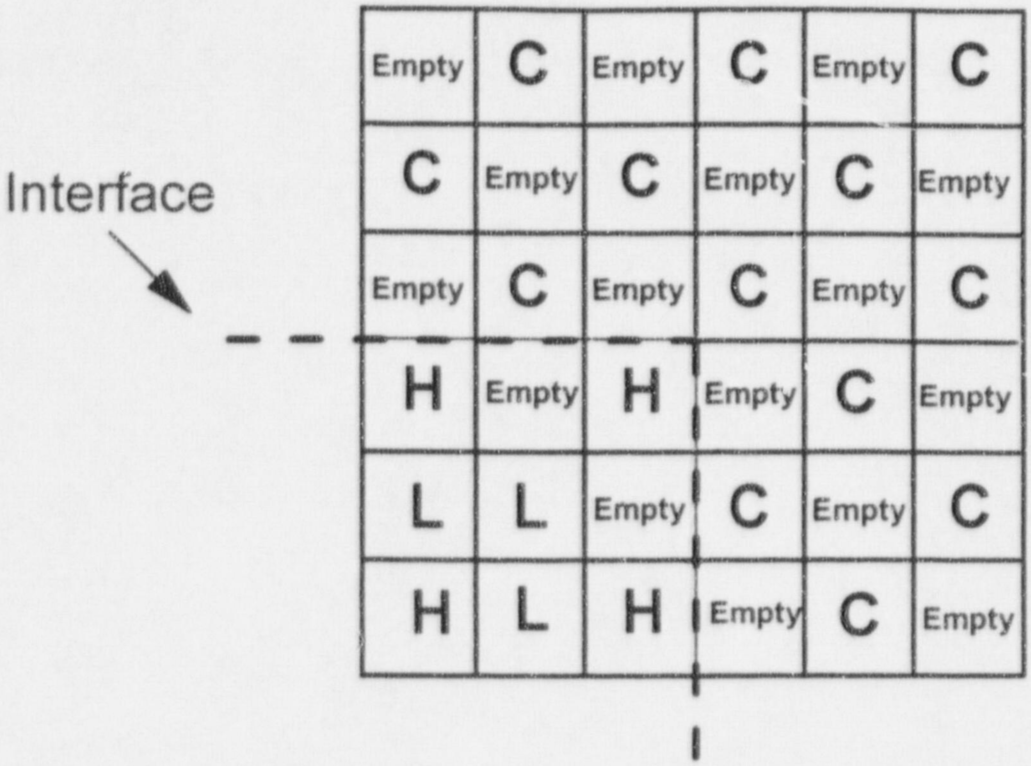


Note:
A = All Cell Enrichment
C = 2-Out-Of-4 Enrichment
Empty = Empty Cell

Boundary Between All Cell Storage and 2-out-of-4 Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace as assembly with an empty cell.

Figure 5.6-4 Interface Requirements

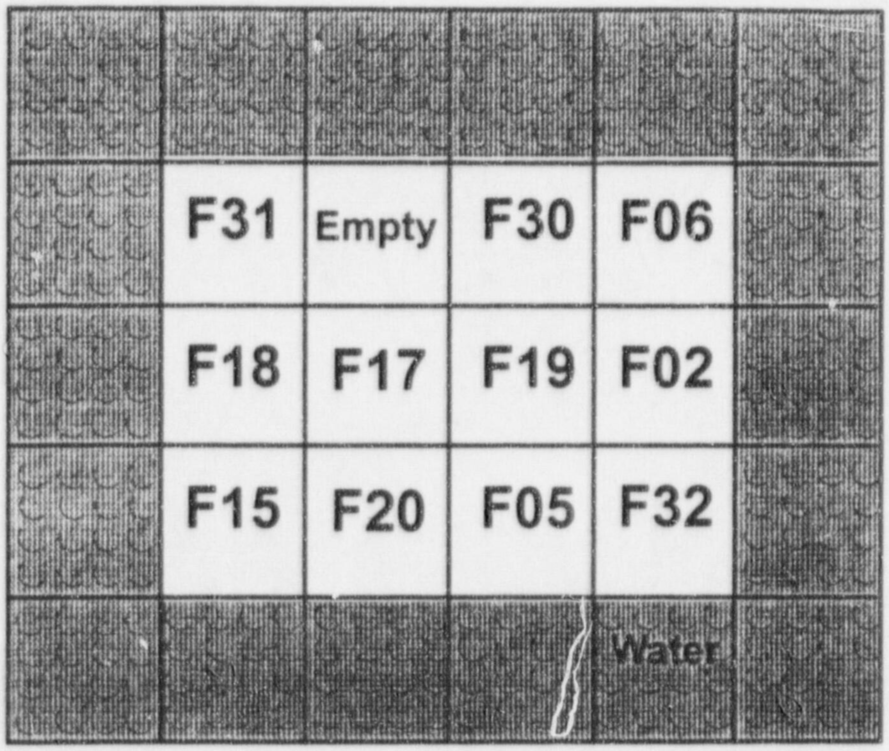


Note:
C = 2-Out-Of-4 Enrichment
L = Low Enrichment of Burned/Fresh
H = High Enrichment of Burned/Fresh
Empty = Empty Cell

Boundary Between 2-out-of-4 Storage and Burned/Fresh Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-5 Interface Requirements



Note: All Assemblies are 3.0 w/o ^{235}U nominal enrichment

Figure 5.6-6 Damaged Fuel Assembly Configuration

3/4.7.12 FIRE BARRIER PENETRATIONS

This specification deleted.

Insert 5

3/4.7.13 FUEL STORAGE POOL BORON CONCENTRATION
3/4.7.14 FUEL ASSEMBLY STORAGE

The spent fuel storage racks contain storage locations for 1407 fuel assemblies. The spent fuel racks have been analyzed in accordance with the methodology contained in WCAP-14416-NP-A, Westinghouse Spent Fuel Rack Criticality Analysis Methodology", Revision 1, November, 1996. This methodology ensures that the spent fuel rack multiplication factor, k_{eff} is less than 0.95, as recommended by ANSI 57.2-1983 and the guidance contained in NRC Letter to All Power Reactor Licensees from B. K. Grimes, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", April 14, 1978. The codes, methods, and techniques contained in the methodology are used to satisfy this k_{eff} criterion. The spent fuel storage racks are analyzed to allow storage of all Westinghouse 17X17 fuel assemblies with nominal enrichments up to 5.0 w/o U-235 utilizing credit for checkerboard configurations, burnup, Integral Fuel Burnable Absorbers, and soluble boron, to ensure that k_{eff} is maintained $\leq$ 0.95, including uncertainties, tolerances, and accident conditions. In addition, the spent fuel pool k_{eff} is maintained $<$ 1.0 including uncertainties and tolerances on a 95/95 basis without soluble boron.

The soluble boron concentration required to maintain $k_{eff} \leq$ 0.95 under normal conditions is 400 ppm.

The following storage configurations and enrichment limits were evaluated in the spent fuel rack criticality analysis:

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal to 2.15 w/o U-235 can be stored in any cell location as shown in Figure 5.6-2. Fuel assemblies with initial nominal enrichments greater than these limits must satisfy a minimum burnup requirement as shown in Figure 3.7-1.

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal to 5.0 w/o U-235 can be stored in a 2 out of 4 checkerboard arrangement as shown in Figure 5.6-2. In the 2 out of 4 checkerboard storage arrangement, 2 fuel assemblies can be stored corner adjacent with 2 empty storage cells.

Westinghouse 17X17 fuel assemblies can be stored in a burned/fresh checkerboard arrangement of a 2X2 matrix of storage cells as shown in Figure 5.6-2. In the burned/fresh 2X2 checkerboard arrangement, three of the fuel assemblies must have an initial nominal enrichment less than or equal to 1.6 w/o U-235, or satisfy a minimum burnup requirement for higher initial enrichments as shown in Figure 5.6-1. The fourth fuel assembly must have an initial nominal enrichment less than or equal to 3.9 w/o U-235, or satisfy a minimum Intergral Fuel Burnable Absorber requirement for higher initial enrichments to maintain the reference fuel assembly k_{∞} less than or equal to 1.455 at 68° F.

Eleven damaged Westinghouse 17X17 fuel assemblies can be stored in a 12 storage cell configuration surrounded by empty cells as shown in Figure 5.6-6. The eleven fuel assemblies contain a nominal enrichment of 3.0 w/o U-235.

Specfications 3.7.14 and 5.6.1.1 ensure that fuel assemblies are stored in the spent fuel racks in accordance with the configurations assumed in the spent fuel rack criticality analysis.

The most limiting accident with respect to the storage configurations assumed in the spent fuel rack criticality analysis is the misplacement of a 5.0 w/o U-235 fuel assembly into an empty storage cell location in the 2 out of 4 checkerboard storage arrangement. The amount of soluble boron required to maintain k_{eff} less than 0.95 due to this fuel misload accident is 850 ppm. The 2000 ppm limit specified in the LCO is consistent with the normal boron concentration maintained in the spent fuel pool, and bounds the 850 ppm required for a fuel misload accident.

Insert 5, cont.

Specification 5.6.1.1 b. requires that a boron concentration of 400 ppm in the spent fuel pool will maintain $k_{eff} \leq 0.95$. A spent fuel pool boron dilution analysis was performed to determine that sufficient time is available to detect and mitigate dilution of the spent fuel pool prior to exceeding the k_{eff} design basis limit of 0.95. The spent fuel pool boron dilution analysis concluded that an inadvertent or unplanned event that would result in a dilution of the spent fuel pool boron concentration from 2000 ppm to 400 ppm is not a credible event.

FNP Unit 2

Technical Specifications

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FNP Unit 2 Technical Specifications Typed Pages

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

3/4.7.14 FUEL STORAGF POOL BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.7.14 The fuel storage pool boron concentration shall be greater than or equal to 2000 ppm.

APPLICABILITY: When fuel assemblies are stored in the fuel storage pool.

ACTION:

With the fuel storage pool boron concentration less than 2000 ppm, immediately suspend movement of fuel assemblies in the fuel storage pool, and initiate action to restore the fuel storage pool boron concentration to within its limit. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.14 The boron concentration of the fuel storage pool shall be determined to be within the limit at least once per 7 days.

3/4.7.15 FUEL ASSEMBLY STORAGE

LIMITING CONDITION FOR OPERATION

3.7.15 The combination of initial enrichment and burnup of each fuel assembly stored in the spent fuel storage pool shall be within the Acceptable Burnup Domain of Figure 3.7-1, or shall be stored in accordance with Specification 5.6.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the spent fuel storage pool.

ACTION:

With the requirements of the above specification not satisfied, initiate action to move the noncomplying fuel assembly to an acceptable storage location. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.15 The combination of initial enrichment and burnup of each fuel assembly shall be verified to be in accordance with Figure 3.7-1 or Specification 5.6.1.1 within 7 days following the relocation or addition of fuel assemblies to the spent fuel storage pool.

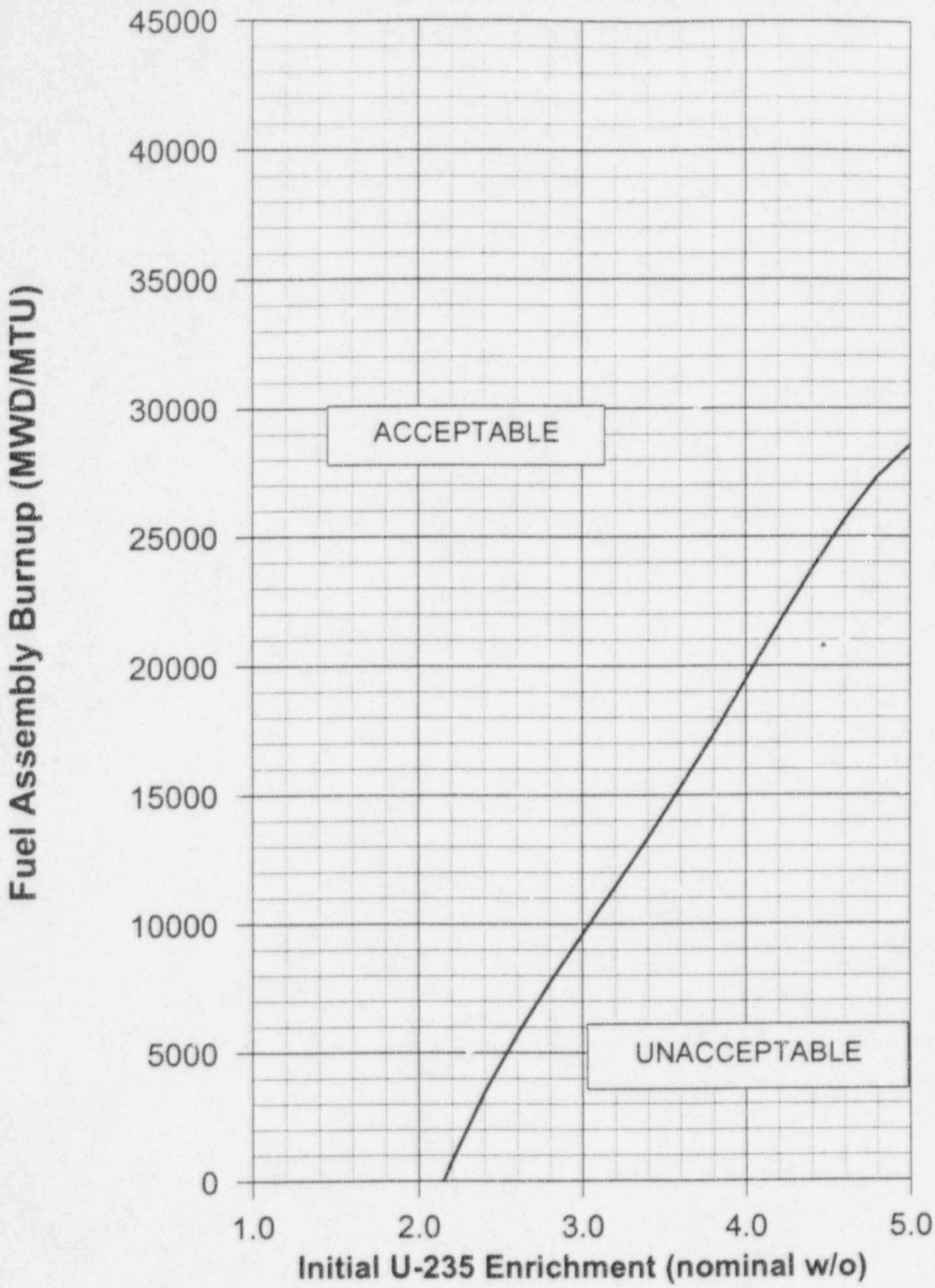


Figure 3.7-1 Fuel Assembly Burnup Limit Requirements For All Cell Storage

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. K_{eff} less than 1.0 when flooded with unborated water, which includes conservative allowances for uncertainties.

b. K_{eff} less than or equal to 0.95 when flooded with water borated to 400 ppm, which includes conservative allowances for uncertainties and biases.

c. A nominal 10.75 inch center-to-center distance between fuel assemblies placed in the storage racks.

d. A maximum nominal enrichment of 5.0 w/o U-235.

e. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "acceptable range" of Figure 3.7-1 may be allowed unrestricted storage in the spent fuel racks (also shown as the All Cell Storage configuration in Figure 5.6-2).

f. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "unacceptable range" of Figure 3.7-1 will be stored in compliance with Figures 5.6-1 through 5.6-5. The high enrichment fuel assemblies shown in the Burned/Fresh Storage configuration in Figure 5.6-2, with maximum nominal enrichments greater than 3.9 w/o U-235, shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly k_{∞} less than or equal to 1.455 at 68°F is maintained.

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with:

a. K_{eff} less than or equal to 0.98, assuming aqueous foam moderation.

b. A nominal 21 inch center-to-center distance between new fuel assemblies placed in the storage racks.

c. A maximum nominal enrichment of:

1. 4.25 weight percent U-235 for Westinghouse fuel assemblies with Standard Fuel Assembly fuel rod diameters.

2. 5.0 weight percent U-235 for Westinghouse fuel assemblies with Optimized Fuel Assembly fuel rod diameters. Westinghouse fuel with Optimized Fuel Assembly fuel rod diameters and maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly K_{∞} less than or equal to 1.455 at 68°F is maintained.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 149.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1407 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

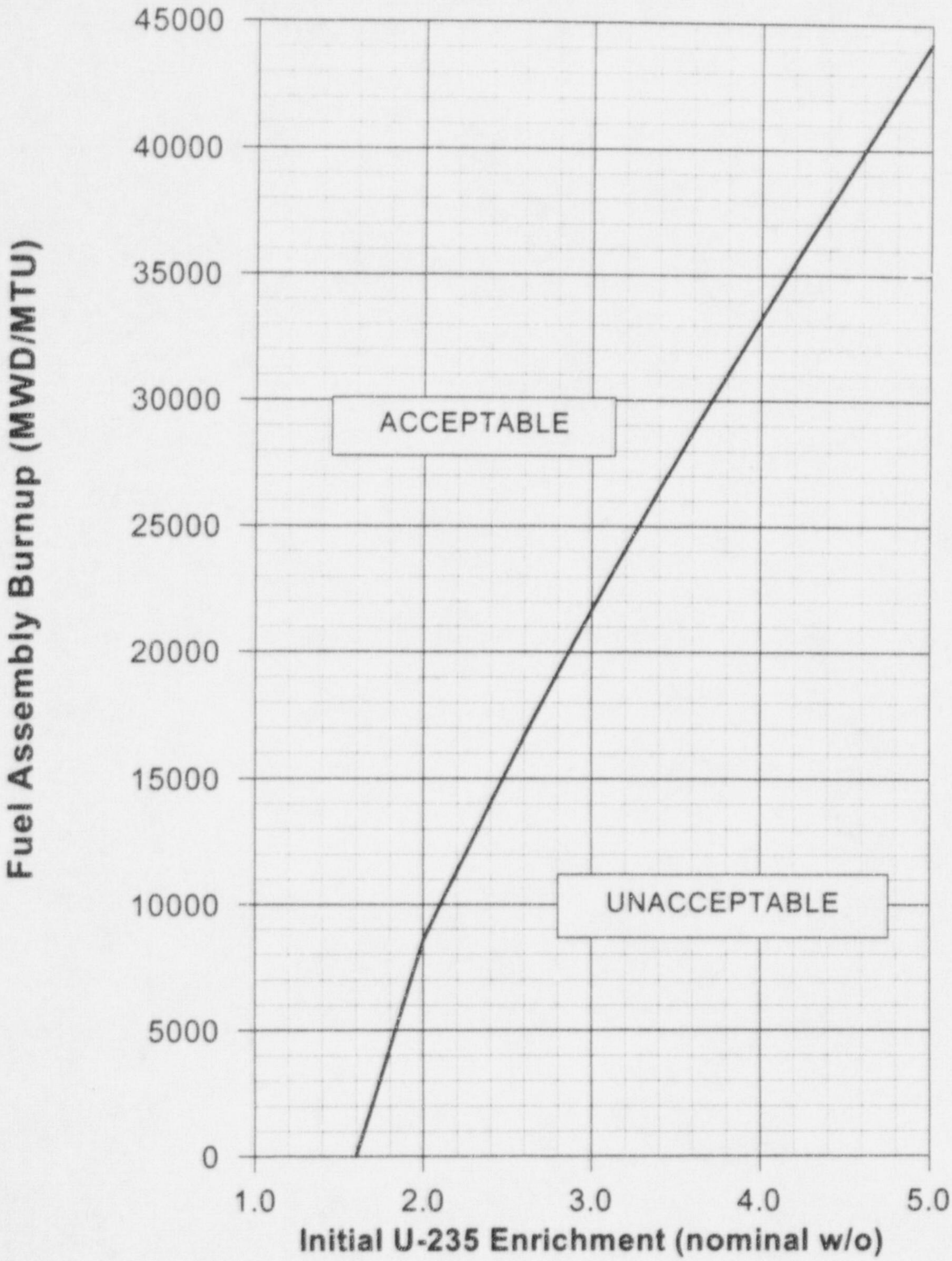
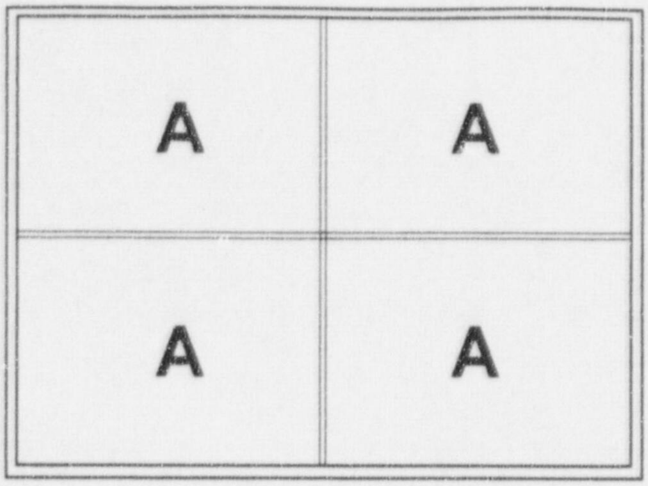
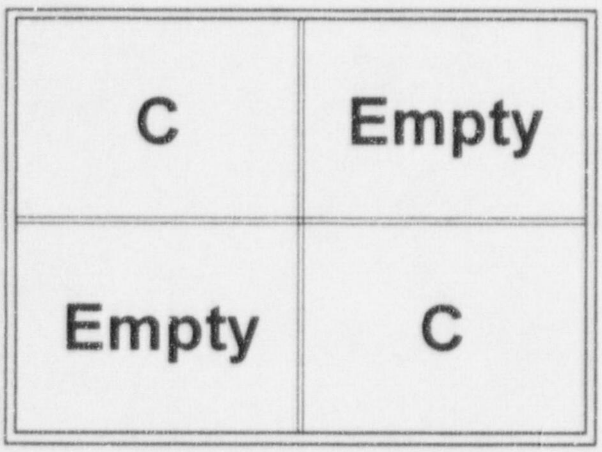


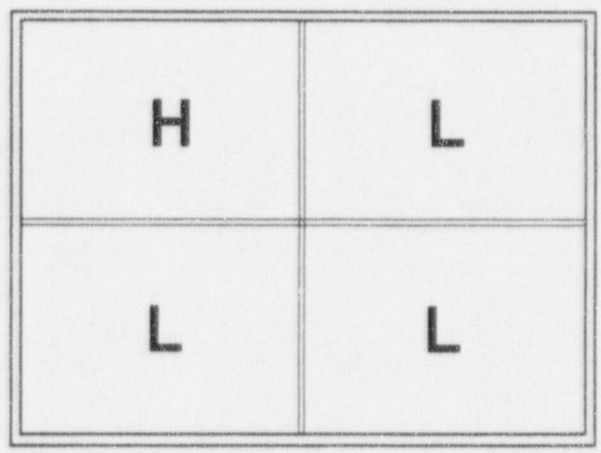
Figure 5.6-1 Fuel Assembly Burnup Limit Requirements for Low Enrichment (L) Assembly of the Burned/Fresh Checkerboard Storage (see Figure 5.6-2)



All Cell Storage



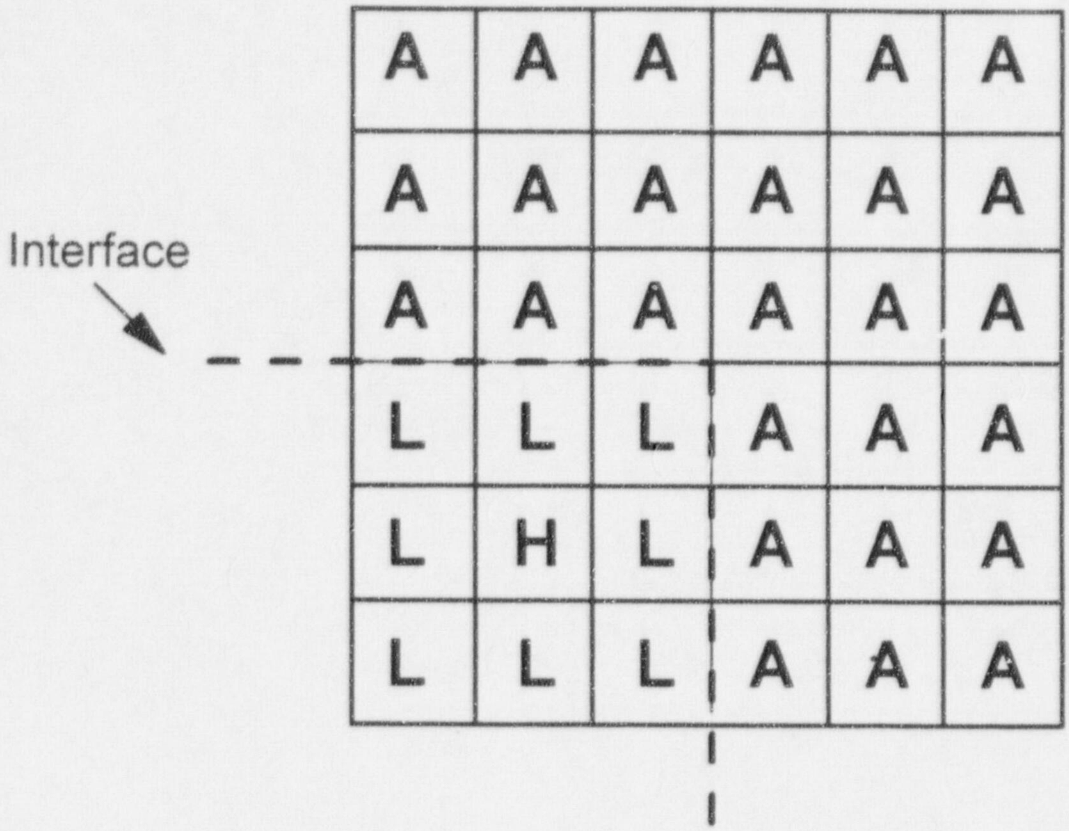
2-out-of-4 Storage



Burned/Fresh Storage

Note:
A = A!l Cell Enrichment (Figure 3.7-1)
C = 2-out-of-4 Enrichment (No restriction on enrichment or burnup)
L = Low Enrichment of Burned/Fresh (Figure 5.6-1)
H = High Enrichment of Burned/Fresh (See section 5.6.1.1.f for IFBA requirement)
Empty = Empty Cell

Figure 5.6-2 Spent Fuel Storage Configurations

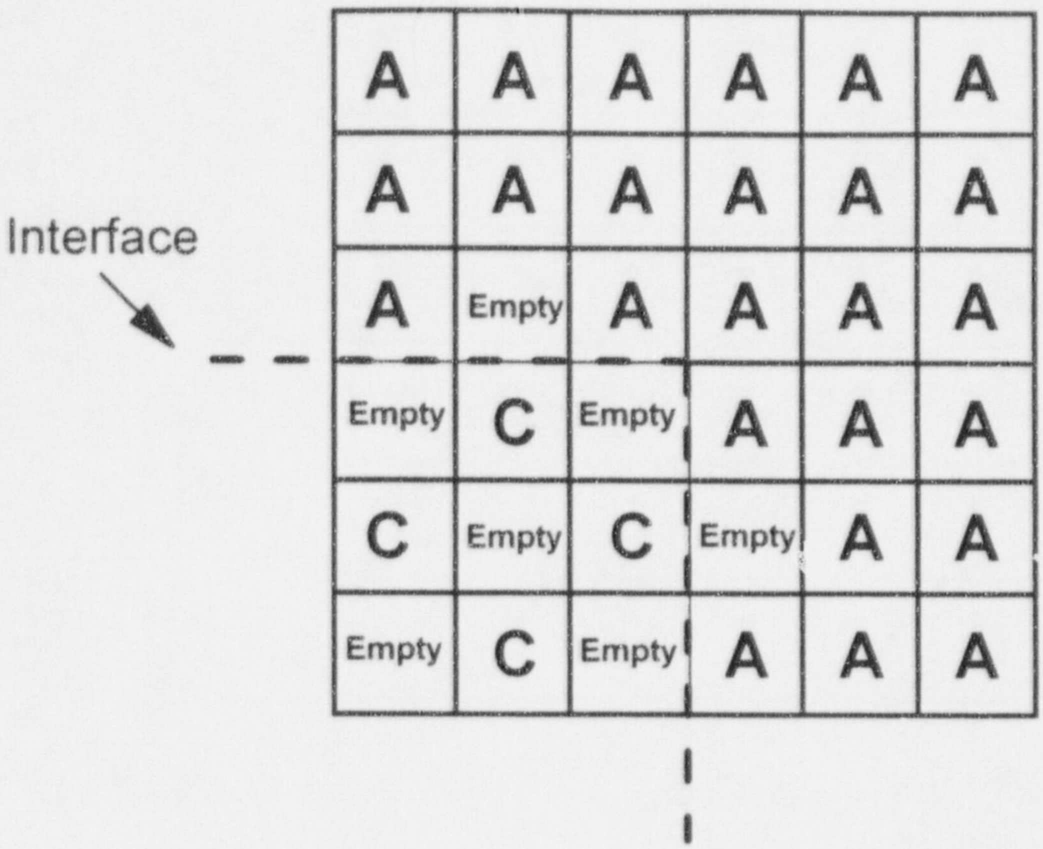


Note:
A = All Cell Enrichment
L = Low Enrichment of Burned/Fresh
H = High Enrichment of Burned/Fresh

Boundary Between All Cell Storage and Burned/Fresh Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-3 Interface Requirements



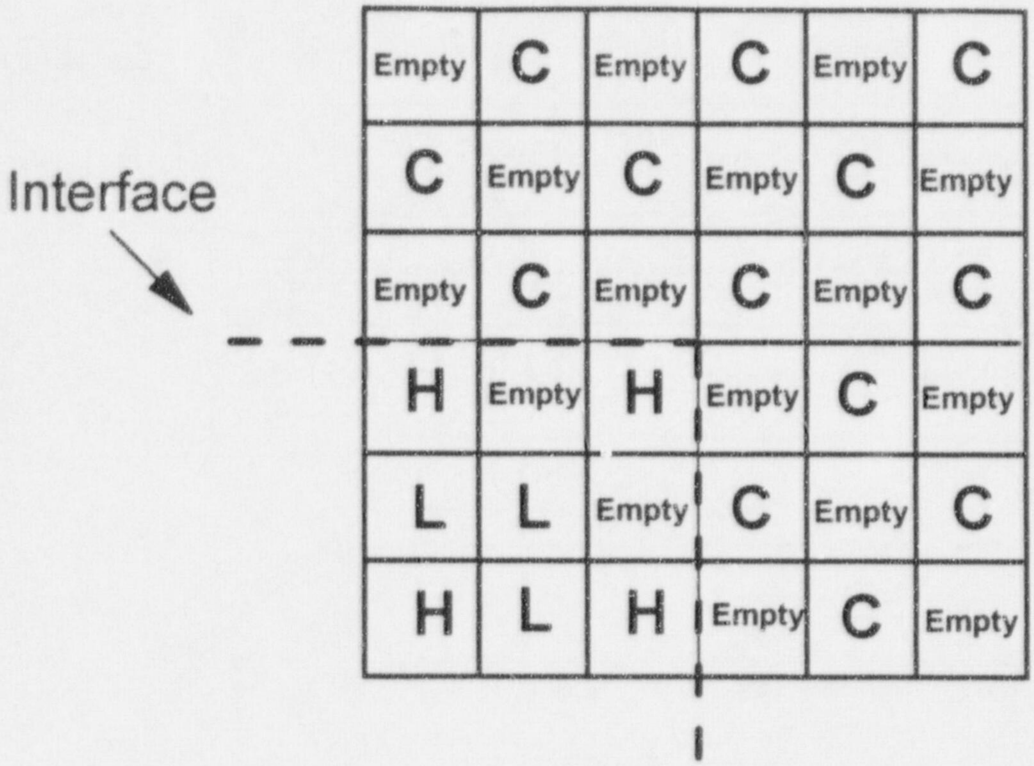
Note:
A = All Cell Enrichment
C = 2-Out-Of-4 Enrichment
Empty = Empty Cell

Boundary Between All Cell Storage and 2-out-of-4 Storage

Note:

1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace as assembly with an empty cell.

Figure 5.6-4 Interface Requirements



Note:

C	=	**2-Out-Of-4 Enrichment**
L	=	**Low Enrichment of Burned/Fresh**
H	=	**High Enrichment of Burned/Fresh**
Empty	=	**Empty Cell**

Boundary Between 2-out-of-4 Storage and Burned/Fresh Storage

Note:

1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-5 Interface Requirements

3/4.7.12 FIRE BARRIER PENETRATION

This specification deleted.

3/4.7.13 AREA TEMPERATURE MONITORING

The area temperature limitations ensure that safety-related equipment will not be subjected to temperature in excess of their environmental qualification temperatures. Exposure to excessive temperatures may degrade equipment and can cause a loss of its OPERABILITY. The temperature limits include an allowance for instrument error of 2°F.

3/4.7.14 & 3/4.7.15 FUEL STORAGE POOL BORON CONCENTRATION & FUEL ASSEMBLY STORAGE

The spent fuel storage racks contain storage locations for 1407 fuel assemblies. The spent fuel racks have been analyzed in accordance with the methodology contained in WCAP-14416-NP-A, Westinghouse Spent Fuel Rack Criticality Analysis Methodology", Revision 1, November, 1996. This methodology ensures that the spent fuel rack multiplication factor, k_{eff} is less than 0.95, as recommended by ANSI 57.2-1983 and the guidance contained in NRC Letter to All Power Reactor Licensees from B. K. Grimes, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", April 14, 1978. The codes, methods, and techniques contained in the methodology are used to satisfy this k_{eff} criterion. The spent fuel storage racks are analyzed to allow storage of all Westinghouse 17X17 fuel assemblies with nominal enrichments up to 5.0 w/o U-235 utilizing credit for checkerboard configurations, burnup, Integral Fuel Burnable Absorbers, and soluble boron, to ensure that k_{eff} is maintained $\leq$ 0.95, including uncertainties, tolerances, and accident conditions. In addition, the spent fuel pool k_{eff} is maintained < 1.0 including uncertainties and tolerances on a 95/95 basis without soluble boron.

The soluble boron concentration required to maintain $k_{eff} \leq 0.95$ under normal conditions is 400 ppm.

The following storage configurations and enrichment limits were evaluated in the spent fuel rack criticality analysis:

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal 2.15 w/o U-235 can be stored in any cell location as shown in Figure 5.6-2. Fuel assemblies with initial nominal enrichments greater than these limits must satisfy a minimum burnup requirement as shown in Figure 3.7-1.

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal to 5.0 w/o U-235 can be stored in a 2 out of 4 checkerboard arrangement as shown in Figure 5.6-2. In the 2 out of 4 checkerboard storage arrangement, 2 fuel assemblies can be stored corner adjacent with 2 empty storage cells.

Westinghouse 17X17 fuel assemblies can be stored in a burned/fresh checkerboard arrangement of a 2X2 matrix of storage cells as shown in Figure 5.6-2. In the burned/fresh 2X2 checkerboard arrangement, three of the fuel assemblies must have an initial nominal enrichment less than or equal to 1.6 w/o U-235, or satisfy a

minimum burnup requirement for higher initial enrichments as shown in Figure 5.6-1. The fourth fuel assembly must have an initial nominal enrichment less than or equal to 3.9 w/o U-235, or satisfy a minimum Integral Fuel Burnable Absorber requirement for higher initial enrichments to maintain the reference fuel assembly k_∞ less than or equal to 1.455 at 68° F.

Specifications 3.7.15 and 5.6.1.1 ensure that fuel assemblies are stored in the spent fuel racks in accordance with the configurations assumed in the spent fuel rack criticality analysis.

The most limiting accident with respect to the storage configurations assumed in the spent fuel rack criticality analysis is the misplacement of a 5.0 w/o U-235 fuel assembly into an empty storage cell location in the 2 out of 4 checkerboard storage arrangement. The amount of soluble boron required to maintain k_{eff} less than 0.95 due to this fuel misload accident is 850 ppm. The 2000 ppm limit specified in the LCO is consistent with the normal boron concentration maintained in the spent fuel pool, and bounds the 850 ppm required for a fuel misload accident.

Specification 5.6.1.1 b. requires that a boron concentration of 400 ppm in the spent fuel pool will maintain $k_{eff} \leq 0.95$. A spent fuel pool boron dilution analysis was performed to determine that sufficient time is available to detect and mitigate dilution of the spent fuel pool prior to exceeding the k_{eff} design basis limit of 0.95. The spent fuel pool boron dilution analysis concluded that an inadvertent or unplanned event that would result in a dilution of the spent fuel pool boron concentration from 2000 ppm to 400 ppm is not a credible event.

FNP Unit 2 Technical Specifications Marked-Up Pages

SECTION

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SECTION

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3/4.7.14 FUEL STORAGE POOL BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.7.14 The fuel storage pool boron concentration shall be greater than or equal to 2000 ppm.

APPLICABILITY: When fuel assemblies are stored in the fuel storage pool.

ACTION:

With the fuel storage pool boron concentration less than 2000 ppm, immediately suspend movement of fuel assemblies in the fuel storage pool, and initiate action to restore the fuel storage pool boron concentration to within its limit. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.14 The boron concentration of the fuel storage pool shall be determined to be within the limit at least once per 7 days.

3/4 7.15 FUEL ASSEMBLY STORAGE

LIMITING CONDITION FOR OPERATION

3.7.15 The combination of initial enrichment and burnup of each fuel assembly stored in the spent fuel storage pool shall be within the Acceptable Burnup Domain of Figure 3.7-1, or shall be stored in accordance with Specification 5.6.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the spent fuel storage pool.

ACTION:

With the requirements of the above specification not satisfied, initiate action to move the noncomplying fuel assembly to an acceptable storage location. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.15 The combination of initial enrichment and burnup of each fuel assembly shall be verified to be in accordance with Figure 3.7-1 or Specification 5.6.1.1 within 7 days following the relocation or addition of fuel assemblies to the spent fuel storage pool.

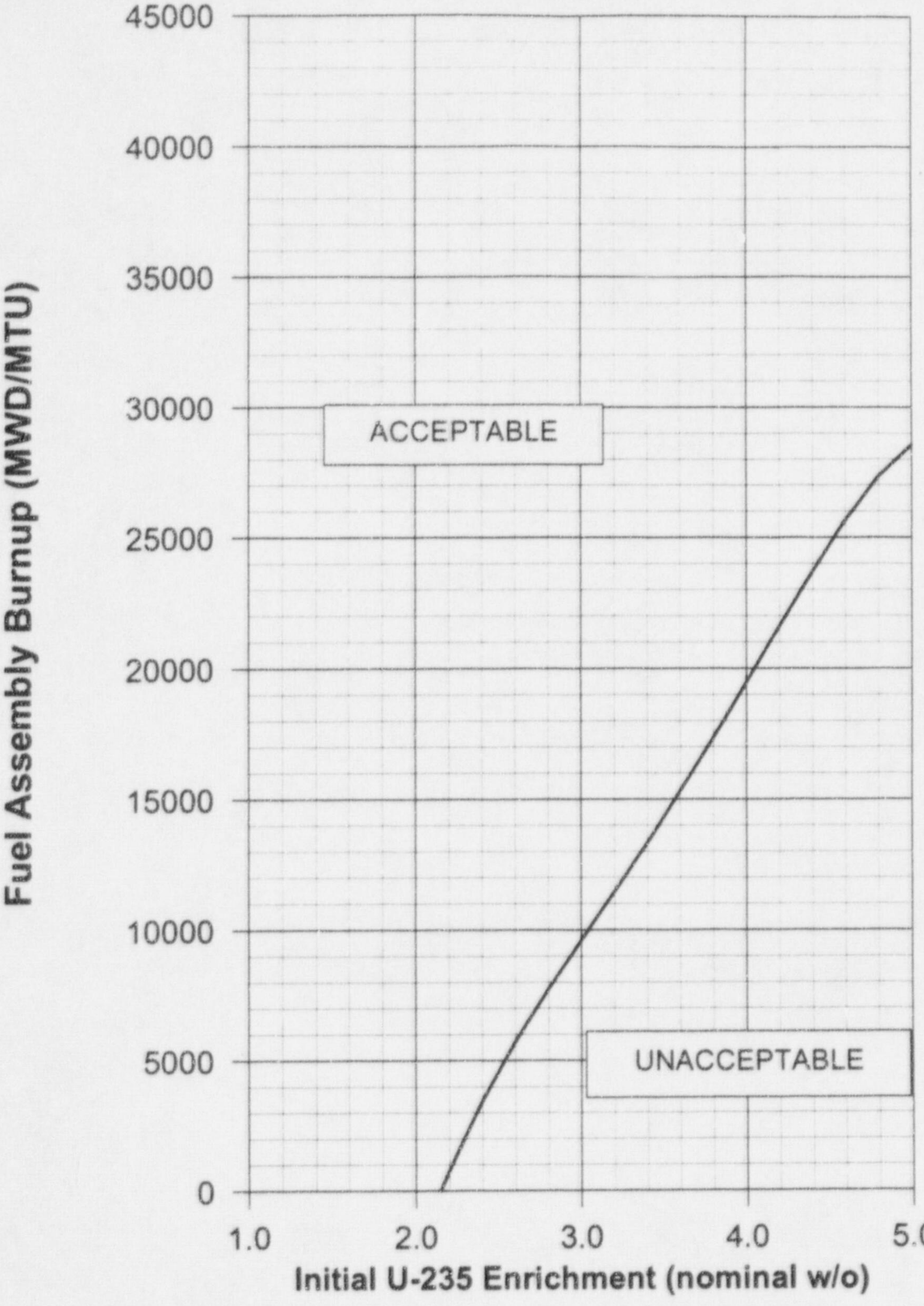


Figure 3.7-1 Fuel Assembly Burnup Limit Requirements For All Cell Storage

5.6 FUEL STORAGE

CRITICALITY

5.6.1.1 The spent fuel storage racks are designed and shall be maintained with:

[Insert 3]

[b.] a. K_{eff} less than or equal to 0.95 when flooded with unborated [borated to 400 ppm] water, which includes conservative allowances for uncertainties and biases.

[c.] b. A nominal 10.75 inch center-to-center distance between fuel assemblies placed in the storage racks.

[d.] c. A maximum nominal enrichment of: [5.0 w/o U-235.]

1. 4.25 weight percent U-235 for Westinghouse LOPAR fuel assemblies.
2. 5.0 weight percent U-235 for Westinghouse OFA or VANTAGE-5 fuel assemblies. Westinghouse OFA and VANTAGE-5 fuel with maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly K_{∞} less than or equal to 1.455 at 68°F is maintained.

[Insert 4]

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with:

a. K_{eff} less than or equal to 0.98, assuming aqueous foam moderation.

b. A nominal 21 inch center-to-center distance between new fuel assemblies placed in the storage racks.

c. A maximum nominal enrichment of:

1. 4.25 weight percent U-235 for Westinghouse LOPAR fuel assemblies, [with Standard Fuel Assembly fuel rod diameter.]
2. 5.0 weight percent U-235 for Westinghouse OFA or VANTAGE-5 fuel assemblies [with Optimized Fuel Assembly fuel rod diameter]. Westinghouse OFA and VANTAGE-5 fuel with [and] maximum nominal enrichments greater than 3.9 weight percent U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly K_{∞} less than or equal to 1.455 at 68°F is maintained.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 149.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1407 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

Insert 3

a. k_{eff} less than 1.0 when flooded with unborated water, which includes conservative allowances for uncertainties.

Insert 4

e. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "acceptable range" of Figure 3.7-1 may be allowed unrestricted storage in the spent fuel racks (also shown as the All Cell Storage configuration in Figure 5.6-2).

f. New or partially spent fuel assemblies with a combination of discharge burnup and initial enrichment in the "unacceptable range" of Figure 3.7-1 will be stored in compliance with Figures 5.6-1 through 5.6-5. The high enrichment fuel assemblies shown in the Burned/Fresh Storage configuration in Figure 5.6-2, with maximum nominal enrichments greater than 3.9 w/o U-235 shall contain sufficient integral burnable absorbers such that a maximum reference fuel assembly k_{∞} less than or equal to 1.455 at 68° F is maintained.

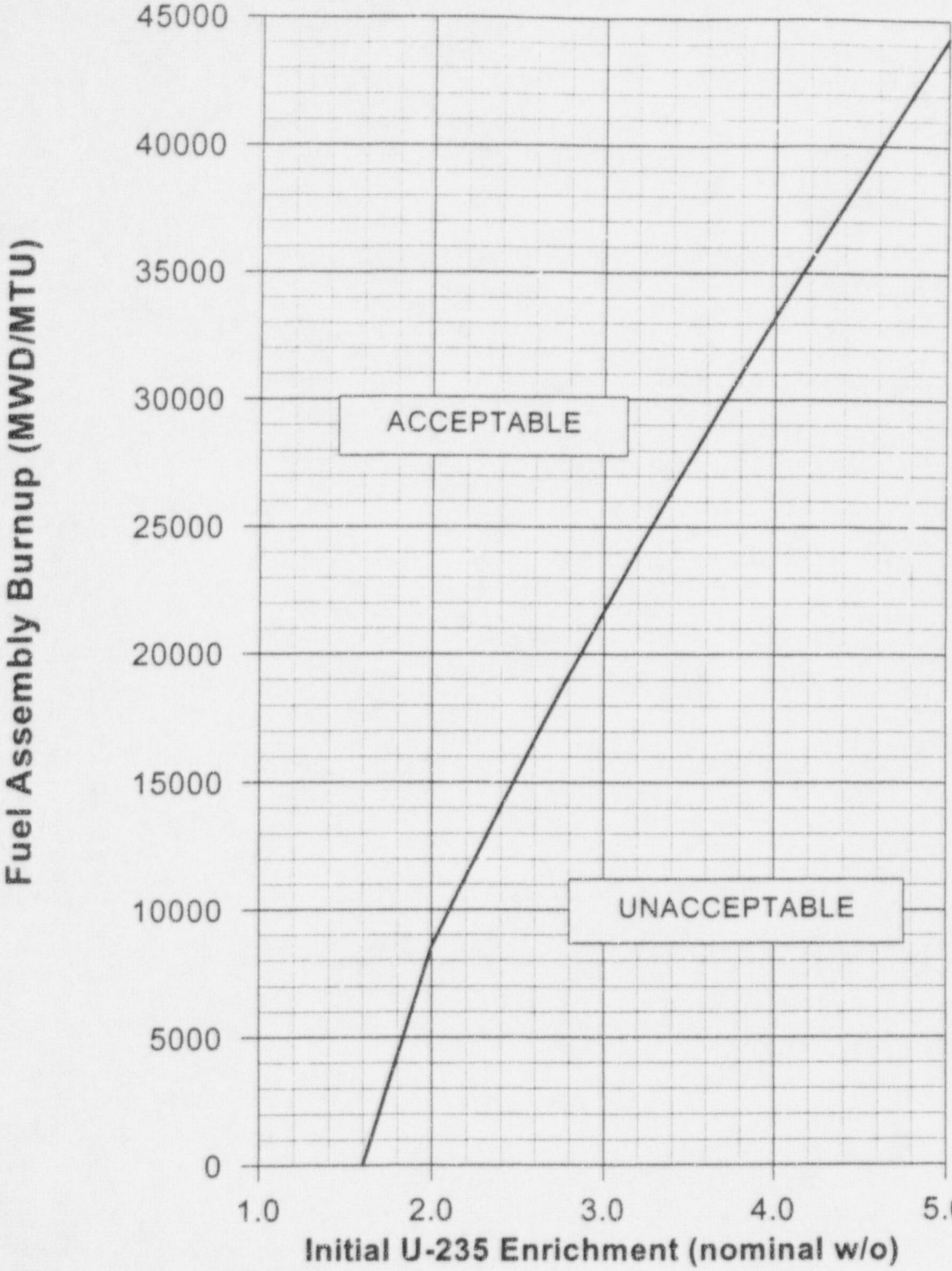
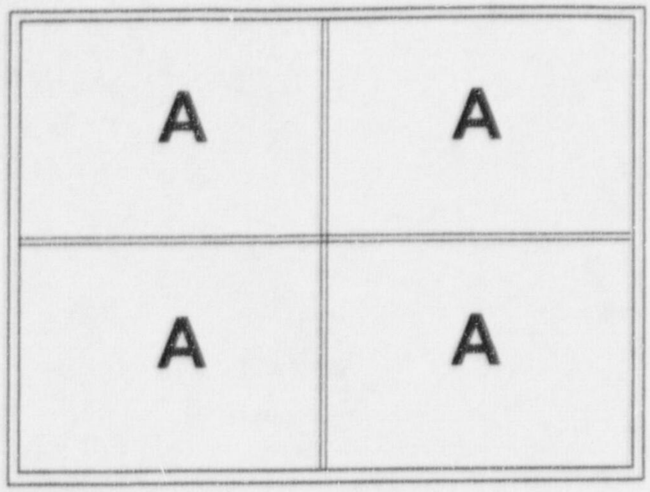
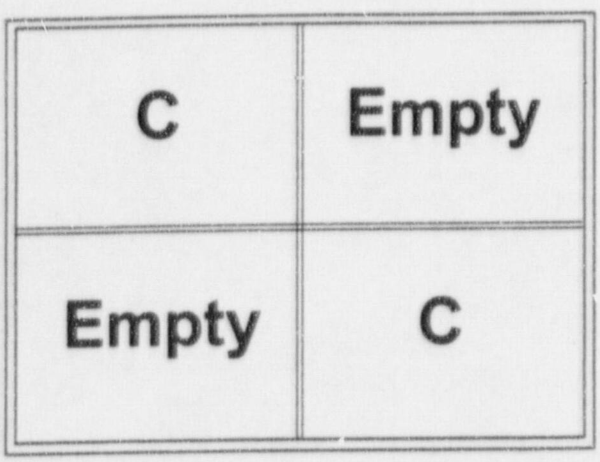


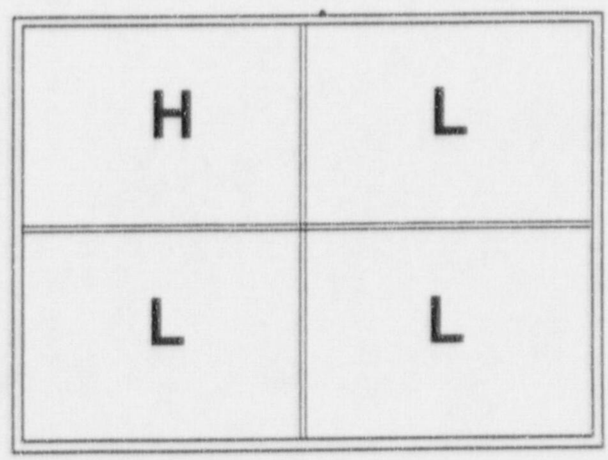
Figure 5.6-1 Fuel Assembly Burnup Limit Requirements for Low Enrichment (L) Assembly of the Burned/Fresh Checkerboard Storage (see Figure 5.6-2)



All Cell Storage



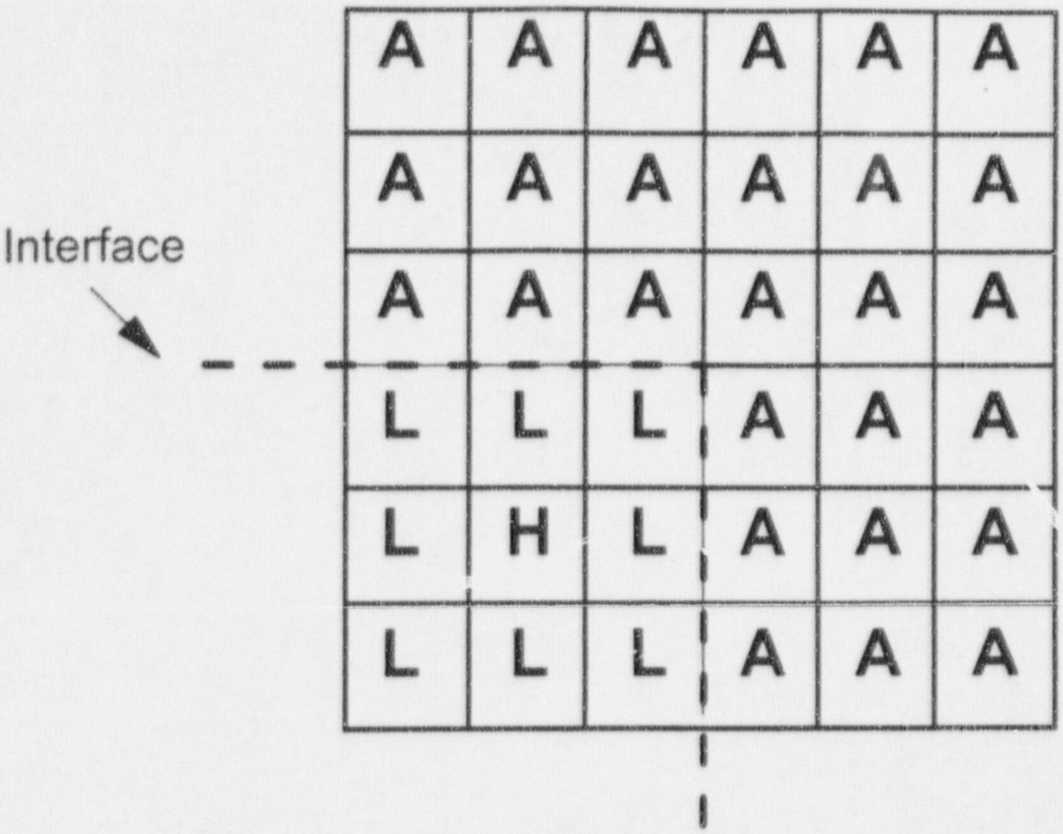
2-out-of-4 Storage



Burned/Fresh Storage

Note:
A = All Cell Enrichment (Figure 3.7-1)
C = 2-out-of-4 Enrichment (No restriction on enrichment or burnup)
L = Low Enrichment of Burned/Fresh (Figure 5.6-1)
H = High Enrichment of Burned/Fresh (See section 5.6.1.1.f for IFBA requirement)
Empty = Empty Cell

Figure 5.6-2 Spent Fuel Storage Configurations

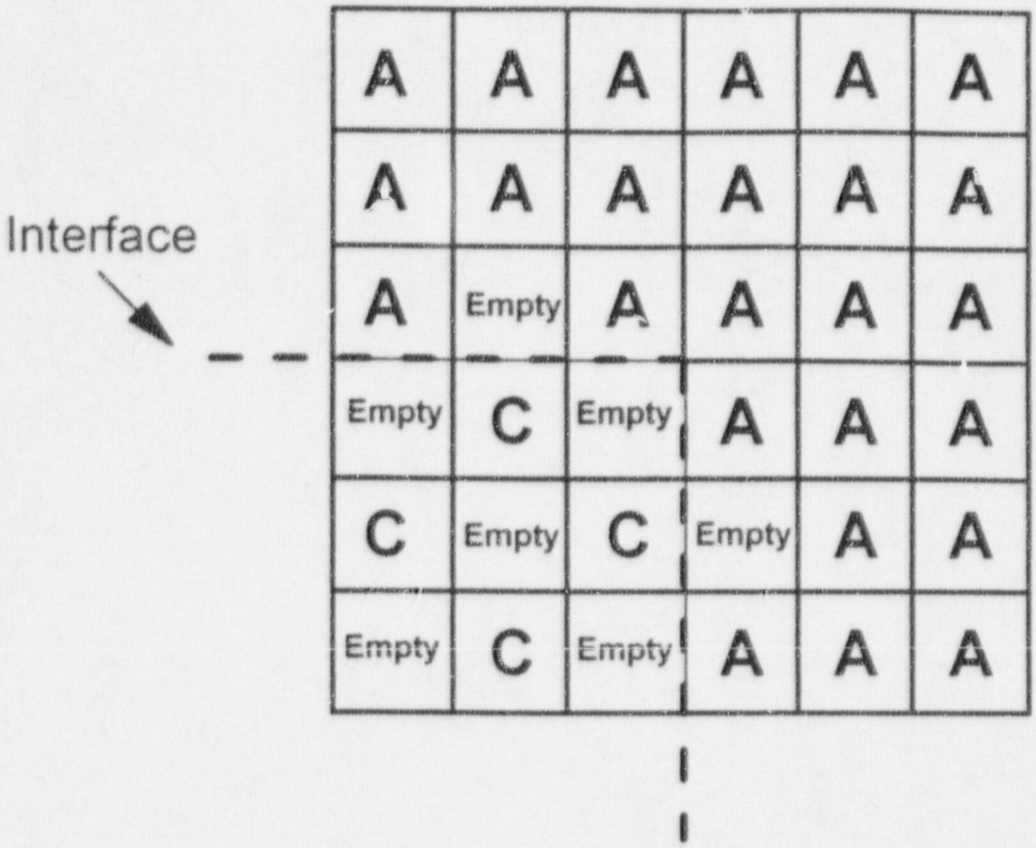


Note:
A = All Cell Enrichment
L = Low Enrichment of Burned/Fresh
H = High Enrichment of Burned/Fresh

Boundary Between All Cell Storage and Burned/Fresh Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-3 Interface Requirements

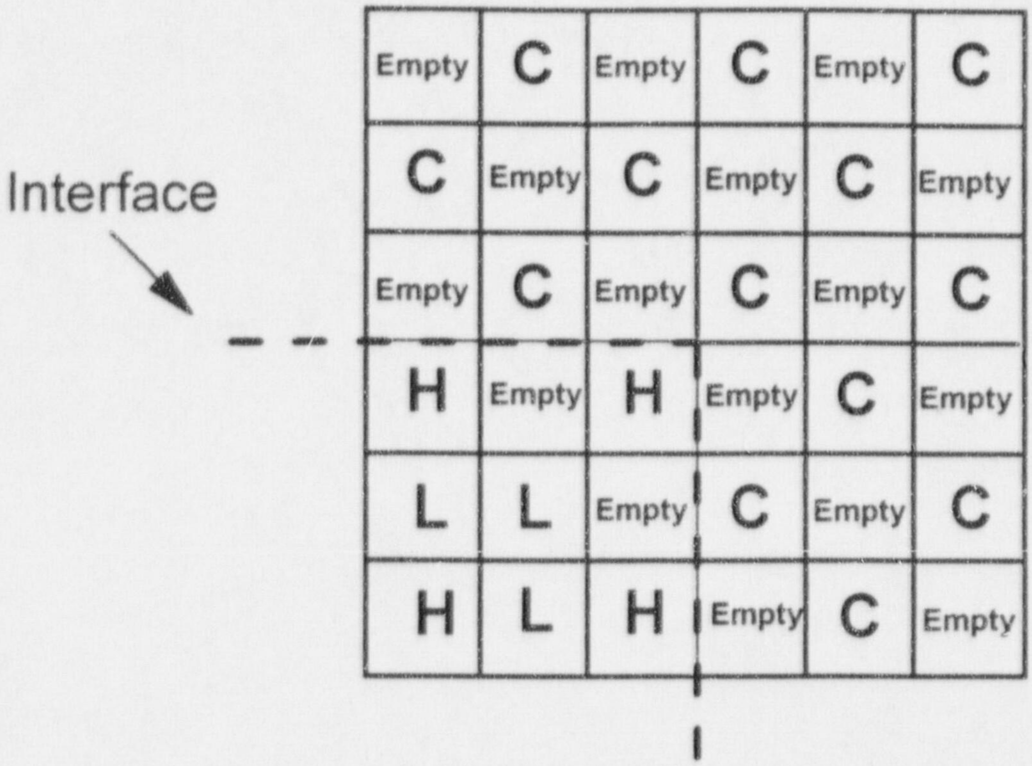


Note:
A = All Cell Enrichment
C = 2-Out-Of-4 Enrichment
Empty = Empty Cell

Boundary Between All Cell Storage and 2-out-of-4 Storage

Note:
1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace as assembly with an empty cell.

Figure 5.6-4 Interface Requirements



Note:

C	=	2-Out-Of-4 Enrichment
L	=	Low Enrichment of Burned/Fresh
H	=	High Enrichment of Burned/Fresh
Empty	=	Empty Cell

Boundary Between 2-out-of-4 Storage and Burned/Fresh Storage

Note:

1. A row of empty cells can be used at the interface to separate the configurations.
2. It is acceptable to replace an assembly with an empty cell.

Figure 5.6-5 Interface Requirements

3/4.7.12 FIRE BARRIER PENETRATIONS

This specification deleted.

3/4.7.13 AREA TEMPERATURE MONITORING

The area temperature limitations ensure that safety-related equipment will not be subjected to temperatures in excess of their environmental qualification temperatures. Exposure to excessive temperatures may degrade equipment and can cause a loss of its OPERABILITY. The temperature limits include an allowance for instrument error of 2°F.

Insert 5

Insert 5

3/4.7.14 FUEL STORAGE POOL BORON CONCENTRATION
3/4.7.15 FUEL ASSEMBLY STORAGE

The spent fuel storage racks contain storage locations for 1407 fuel assemblies. The spent fuel racks have been analyzed in accordance with the methodology contained in WCAP-14416-NP-A, Westinghouse Spent Fuel Rack Criticality Analysis Methodology", Revision 1, November, 1996. This methodology ensures that the spent fuel rack multiplication factor, k_{eff} is less than 0.95, as recommended by ANSI 57.2-1983 and the guidance contained in NRC Letter to All Power Reactor Licensees from B. K. Grimes, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", April 14, 1978. The codes, methods, and techniques contained in the methodology are used to satisfy this k_{eff} criterion. The spent fuel storage racks are analyzed to allow storage of all Westinghouse 17X17 fuel assemblies with nominal enrichments up to 5.0 w/o U-235 utilizing credit for checkerboard configurations, burnup, Integral Fuel Burnable Absorbers, and soluble boron, to ensure that k_{eff} is maintained $\leq$ 0.95, including uncertainties, tolerances, and accident conditions. In addition, the spent fuel pool k_{eff} is maintained $<$ 1.0 including uncertainties and tolerances on a 95/95 basis without soluble boron.

The soluble boron concentration required to maintain $k_{eff} \leq$ 0.95 under normal conditions is 400 ppm.

The following storage configurations and enrichment limits were evaluated in the spent fuel rack criticality analysis:

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal to 2.15 w/o U-235 can be stored in any cell location as shown in Figure 5.6-2. Fuel assemblies with initial nominal enrichments greater than these limits must satisfy a minimum burnup requirement as shown in Figure 3.7-1.

Westinghouse 17X17 fuel assemblies with nominal enrichments less than or equal to 5.0 w/o U-235 can be stored in a 2 out of 4 checkerboard arrangement as shown in Figure 5.6-2. In the 2 out of 4 checkerboard storage arrangement, 2 fuel assemblies can be stored corner adjacent with 2 empty storage cells.

Westinghouse 17X17 fuel assemblies can be stored in a burned/fresh checkerboard arrangement of a 2X2 matrix of storage cells as shown in Figure 5.6-2. In the burned/fresh 2X2 checkerboard arrangement, three of the fuel assemblies must have an initial nominal enrichment less than or equal to 1.6 w/o U-235, or satisfy a minimum burnup requirement for higher initial enrichments as shown in Figure 5.6-1. The fourth fuel assembly must have an initial nominal enrichment less than or equal to 3.9 w/o U-235, or satisfy a minimum Intergral Fuel Burnable Absorber requirement for higher initial enrichments to maintain the reference fuel assembly k_{∞} less than or equal to 1.455 at 68° F.

Specfications 3.7.15 and 5.6.1.1 ensure that fuel assemblies are stored in the spent fuel racks in accordance with the configurations assumed in the spent fuel rack criticality analysis.

The most limiting accident with respect to the storage configurations assumed in the spent fuel rack criticality analysis is the misplacement of a 5.0 w/o U-235 fuel assembly into an empty storage cell location in the 2 out of 4 checkerboard storage arrangement. The amount of soluble boron required to maintain k_{eff} less than 0.95 due to this fuel misload accident is 850 ppm. The 2000 ppm limit specified in the LCO is consistent with the normal boron concentration maintained in the spent fuel pool, and bounds the 850 ppm required for a fuel misload accident.

Specification 5.6.1.1 b. requires that a boron concentration of 400 ppm in the spent fuel pool will maintain $k_{eff} \leq$ 0.95. A spent fuel pool boron dilution analysis was performed to determine that sufficient time is available to detect and mitigate dilution of the spent fuel pool prior to exceeding the k_{eff} design basis limit of 0.95. The spent fuel pool boron dilution analysis concluded that an

Insert 5, cont.

inadvertent or unplanned event that would result in a dilution of the spent fuel pool boron concentration from 2000 ppm to 400 ppm is not a credible event.

ATTACHMENT IV

FARLEY NUCLEAR PLANT

TECHNICAL SPECIFICATIONS CHANGE REQUEST

SPENT FUEL POOL SOLUBLE BORON CREDIT

<u>CRITICALITY ANALYSIS</u>