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May 18, 1993

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Jerry R. Kline
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Washington, D.C. 20555

Re: NORTHEAST NUCLEAR ENERGY COMPANY, Millstone Nuclear Power Station, Unit No. 2, Docket No. 50-336-OLA (Spent Fuel Pool Design)

Dear Administrative Judges:

Further to our letter of May 6, 1993, attached for information is a copy of the Millstone Unit No. 2 license amendment application filed on May 14, 1993. The amendment application relates principally to Region C of the spent fuel pool.

Very truly yours,

DARepka

Nicholas S. Reynolds
David A. Repka

Counsel for Northeast
Nuclear Energy Company

Enclosure

cc: Service List



DS03

**NORTHEAST UTILITIES**

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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May 14, 1993

Docket No. 50-336
B14470

Re: 10CFR50.90

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Proposed Revision to Technical Specifications
Spent Fuel Pool Modifications

Pursuant to 10CFR50.90, Northeast Nuclear Energy Company (NNECO) hereby proposes to amend its Operating License No. DPR-65 by incorporating the attached proposed changes into the Technical Specifications of Millstone Unit No. 2. NNECO has determined that the proposed amendment involves no significant hazards consideration.

Background

The Millstone Unit No. 2 Spent Fuel Pool (SFP) is currently divided into 3 regions. Region A permits fuel to be stored which meets the limits of Technical Specification Figure 3.9-4. Region B permits the storage of any fuel with a maximum nominal enrichment of 4.5 weight percent U-235, but in a 3-out-of-4 configuration with a cell blocker in the 4th location. Region C permits fuel to be stored which meets the limits of Technical Specification Figure 3.9-1 for unconsolidated fuel, or Technical Specification Figure 3.9-3 for consolidated fuel.

Description of the Proposed Changes

The Millstone Unit No. 2 Region C unpoisoned spent fuel racks were originally licensed for 75 percent storage occupancy of intact spent fuel in 728 of the 962 cells (234 cells were blocked off). This change proposes to introduce neutron absorbing (poison) rodlets (pins) into the stored fuel and increase the required burnup in Region C to permit removal of the cell blockers, thus reclaiming the 234 blocked spent fuel storage locations. The total fuel storage capacity, considering the removal of these cell blockers, continues to be less than that allowed as a result of consolidation.

The proposed technical specification changes follow:

Section 1.39, "Storage Pattern," on page 1-8 involves deleting the reference to Region C, since the cell blocking devices are being removed for Region C.

Section 3.9.16.1, "Limiting Condition for Operation," on page 3/4 9-19, is changing "120 days" radioactive decay time to "1 year."

Section 4.9.16.1, "Surveillance Requirements," also on page 3/4 9-19, is also changing "120 days" to "1 year." Both changes being made to page 3/4 9-19 are to increase the radioactive decay time to ensure that the dose consequences remain bounded by the current analysis.

Section 4.9.18.1, "Surveillance Requirement," on page 3/4 9-22, involves deleting the portion of the sentence that reads, "....are within the enrichment and burn-up limits of Figure 3.9.1 by checking the assembly's design and burn-up documentation." Being added is, "satisfy either:

(a) Fuel assembly enrichment and burnup are within the limits of Figure 3.9-1a by checking the assembly's design and burnup documentation; or

(b) Fuel assembly enrichment and burnup are within the limits of Figure 3.9-1b by checking the assembly's design and burnup documentation, and borated stainless steel poison pins are installed in the assembly's center guide tube and in two diagonally opposite guide tubes."

This requirement is being changed to specify the enrichment and burnup requirements for Region C, as well as the installation of the poison pins.

Figure 3.9-1, "Minimum Required Fuel Assembly Exposure as a Function of Initial Enrichment to Permit Storage in Region C," on page 3/4 9-23, is being changed to Figure 3.9-1a, "Minimum Required Fuel Assembly Exposure as a Function of Initial Enrichment to Permit Storage in Region C," to reflect the non-poisoned fuel assemblies to be stored in Region C; and Figure 3.9-1b, "Minimum Required Fuel Assembly Exposure as a Function of Initial Enrichment to Permit Storage in Region C with Poison Pins Installed," is being added as page 3/4 9-23a to reflect the poisoned fuel assemblies to be stored in Region C.

Figure 3.9-2, "Spent Fuel Pool Arrangement Unit #2," on page 3/4 9-24 is being changed to remove the cell blocking devices from Region C and to correct a typographical error in Region A.

Page 3/4 9-26, Section 3.9.19.1, "Limiting Condition from Operation," and Section 4.9.19.1, "Surveillance Requirements," are being deleted since all of the cell blocking devices are being removed from Region C.

Section 3.9.19.2, "Limiting Condition for Operation," and Section 4.9.19.2, "Surveillance Requirements," formerly on page 3/4 9-26a, are being renumbered to Section 3.9.19 and 4.9.19 and moved to page 3/4 9-26, respectively, due to the above-mentioned deletions.

Section 3/4 9.18, "Spent Fuel Pool — Reactivity Condition," on page B 3/4 9-3, is being changed to add references of Figure 3.9-1a and 3.9-1b.

Section 3/4.9.19, "Spent Fuel Pool — Storage Pattern," on page B 3/4 9-4, involves deleting all references to Region C; Paragraph 2 is being deleted in its entirety.

Section 5.6.1(d), "Criticality," on page 5-5, involves deleting the last three sentences that begin, "Fuel assemblies stored in this region must comply with Figure 3.9-1 to ensure that the design burn-up has been sustained. Fuel assemblies stored in this region are placed in a 3 out of 4 STORAGE PATTERN for reactivity control. The contents of consolidated fuel storage boxes to be stored in this region must comply with Figure 3.9-3." This is being replaced with, "Fuel assemblies stored in this region must comply with Figure 3.9-1a or 3.9-1b to ensure that the design burn-up has been sustained. Additionally, fuel assemblies utilizing Figure 3.9-1b require that borated stainless steel poison pins are installed in the fuel assembly's center guide tube and in two diagonally opposite guide tubes. The poison pins are solid 0.87 inch O.D. borated stainless steel, with a boron content of 2 weight percent boron."

Also on page 5-5, Section 5.6.1(e), involves deleting, "in the 4th location of the storage rack" and the last sentence that reads, "Placement of consolidated fuel in the 4th location is only permitted if all surrounding cells of the STORAGE PATTERN are occupied by consolidated fuel," is being replaced with, "The contents of consolidated fuel storage boxes to be stored in this region must comply with Figure 3.9-3."

The last change to be made appears in Section 5.6.3, "Capacity," on page 5-5a. The reference of "1237" is being replaced with "1306," and "109" is being replaced with "40." The value of blocked locations is the number of storage locations that would remain blocked, given maximum SFP utilization.

Attachment 1 indicates the current technical specifications with the proposed changes noted. Attachment 2 provides the proposed revision replacement pages to the technical specification.

## Safety Assessment

A finding of no significant hazards consideration was determined, based on safety assessments associated with criticality, radiological, mechanical, material, structural, thermal/pool cooling, and potential accident considerations resulting from the proposed change. This is discussed in detail in the following section. A more comprehensive discussion of the safety assessments is found in the safety assessment summaries attached. Attachment 3 provides the Criticality Safety Analysis Summary. Attachment 4

provides the Safety Assessment Summary of Criticality and Fuel Handling considerations. Attachment 5 provides the Safety Assessment Summary for the Radiological, Mechanical, Material, Structural, Thermal/Pool Cooling, and Accident Considerations.

Significant Hazards Consideration

In accordance with 10CFR50.92, NNECO has reviewed the proposed changes and has concluded that they do not involve a significant hazards consideration (SHC). The basis for this conclusion is that the three criteria of 10CFR50.92(c) are not compromised. The proposed changes do not involve an SHC because the changes would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   Final Safety Analysis Report (FSAR) Chapter 14 accidents previously analyzed that are relevant to fuel in the SFP are:

   a. Fuel Handling accident (FSAR 14.7.4)

   b. Spent Fuel Cask Drop accident (FSAR 14.7.5)

   The addition of poison pins or removal of blocking devices will not have any effect on the probability of occurrence of either of these two previously analyzed accidents. Both the radiological and criticality consequences of these two accidents must be considered. An assessment of the criticality aspects of these two accidents was reperformed to ensure that the $\leq .95\ K_{eff}$ criterion was not violated. The criticality analyses show that under normal and accident conditions, this criterion is not violated. There is no change in the radiological consequences of the dropped fuel assembly accident since the installation of poison pins will not change the damage caused by the fuel assembly drop. The cask drop accident has been reanalyzed for the radiological consequences due to the change in fuel storage capacity in the "targeted footprint area." The calculated radiological consequences from the rupture of one-year-old fuel assemblies in the cask drop footprint (782 assemblies) is bounded by the current analysis. The thyroid dose is zero, since all of the iodine has decayed. The whole body dose calculated value is 0.097 roentgen equivalent man (REM). This is less than the limiting dose presented in the FSAR of 0.241 REM for the rupture of 587 assemblies with 120 days decay. All of the above consequences are less than 1 percent of the 10CFR100 limit. Based on this analysis, the decay time was increased from 120 days to 1 year for fuel within the footprint area, prior to allowing a cask to be brought to the refueling floor.

   Fuel/fuel rack and fuel pool qualifications have been evaluated and determined to be unaffected by this change. The mechanical design configuration of the rodlets is similar to the shape, size, and weight of

a control element assembly (CEA) finger. The rodlets are approximately 0.87 inch outside diameter (OD) borated stainless steel, with a boron content of 2 weight percent (w/o). The OD of the poison rodlets is less than that of a CEA. The length of the poison rodlet is approximately 0.75 inch longer than a CEA finger. The weight of three poison rodlets is less than that of a CEA. The material (borated stainless steel) is American Society for Testing and Materials (ASTM) approved and has been licensed by the NRC for use in spent fuel storage technologies and spent fuel pools. The thermal considerations of fuel are unaffected by the presence of the rodlets because the guide tube is designed for the presence of a CEA; therefore, it is not a primary coolant flow area. The fuel rack normal thermal cooling and malfunction blocked cooling scenarios are unaffected by the presence of the rodlets in the fuel assembly. The fuel pool cooling scenarios of normal, abnormal, single-active failure, and loss of forced cooling are unaffected by the increase in intact fuel storage resulting from the rodlets because License Amendment No. 128, dated March 31, 1988, accounted for an intact spent fuel inventory decay heat history to a maximum of 1965 fuel assemblies. Therefore, the pool cooling scenarios are bounded by previous licensed analyses. The structural effect of the weight of the rodlet on the fuel/fuel rack/fuel pool structural interfaces and drop qualifications are unaffected because, with respect to the fuel, the combined weight of three rodlets is less than the weight of a CEA. With respect to the fuel rack and fuel pool structural interfaces, they are bounded by the weight of a consolidated fuel storage box (~2500 lbs.) in every one of the 1346 storage locations per License Amendment No. 128, dated March 31, 1988. Therefore, this proposed change does not involve an increase in the probability or consequences of an accident previously evaluated.

2. Create the possibility of a new or different kind of accident than any previously evaluated.

   The removal of the blocking devices could not create the possibility of a new or different type of accident. The blocking devices were never credited in any analysis. These were considered as a backup to administrative control. The storage of additional fuel assemblies could not create the possibility of a new or different type of accident. Accidental withdrawal of the poison pins is not possible since special tooling is required to remove them, and they are completely contained within the guide tubes of the designated assemblies. Misloading of the poison pins is prevented due to the design of the installation equipment, strict procedural controls, and double verification that will be in place to ensure the poison pins are installed properly. The use of burnup versus enrichment curves has already been used in the Millstone Unit No. 2 SFP and, therefore, does not create the possibility of a new or different type of accident.

   All failure modes that cause an accident have been evaluated (design bases, fuel handling, and cask drop accidents). A new failure mode that could represent a new unanalyzed accident has not been identified.

Therefore, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

All conditions that constitute a malfunction have been evaluated (fuel/fuel rack/fuel pool structural interface qualifications). A new condition that represents a malfunction has not been identified. Therefore, no new malfunction has been created.

3. Involve a significant reduction in a margin of safety.

The margin of safety for criticality is the 0.95 $K_{eff}$ criterion for normal and accident conditions. The criticality analyses show that under normal and accident conditions, 0.95 $K_{eff}$ or less is maintained.

The mechanical properties and weight of the fuel assemblies remain essentially unchanged. The fuel racks are freestanding, and with the inclusion of the weight of the three rodlets per assembly, the original mechanical and thermal analyses of the fuel assembly/fuel rack and fuel pool building interfaces currently approved by License Amendment No. 128, dated March 31, 1988, remain valid and conservative. Therefore, this change does not involve a significant reduction in a margin of safety.

All of the mechanical and criticality design qualifications, attributes, and parameters of the fuel racks and fuel pool to store nuclear spent fuel and maintain the fuel assemblies coolable and in a safe subcritical configuration of $K_{eff} \leq .95$ remain valid, unaffected, and unchanged.

Environmental Consideration

NNECO has reviewed the proposed license amendment against the criteria of 10CFR51.22 for environmental considerations. The proposed change does not increase the type and amounts of effluents that may be released off site, nor significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, NNECO concludes that the proposed change meets the criteria delineated in 10CFR51.22(c)(a) for categorical exclusion from the requirements for an environmental impact statement.

Conclusion

The Millstone Unit No. 2 Plant Operating Review Committee and Nuclear Review Board have reviewed the proposed changes and have concurred with the above determination, that the modification and proposed amendment described in this submittal involve no significant hazards consideration.

Regarding our schedule for this amendment, we request issuance in mid-November 1993, with the amendment effective within 30 days of issuance. The timing of this issuance must be coordinated with the rodlet delivery and implementation schedule. Accordingly, NNECO will discuss the exact requested issuance date with the NRC in early November.

In accordance with 10CFR50.91(b), we are providing the State of Connecticut with a copy of this proposed amendment.

Should the Staff require any additional information to process this request, we remain available to promptly provide such information.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: J. F. Opeka
Executive Vice President

BY: E. A. DeBarba
E. A. DeBarba
Vice President

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
P. D. Swetland, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

Mr. Kevin McCarthy, Director
Radiation Control Unit
Department of Environmental Protection
Hartford, CT 06116

Subscribed and sworn to before me

this 14th day of May, 1993

Ruth J. Dietrich

Date Commission Expires: 3/31/95

Docket No. 50-336
B14470

Attachment 1

Millstone Nuclear Power Station, Unit No. 2

Proposed Revision to Technical Specifications
Spent Fuel Pool Modifications

Marked Up Pages of Technical Specifications

May 1993

VENTING

1.35 VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during venting. Vent, used in system names, does not imply a VENTING process.

MEMBER(S) OF THE PUBLIC

1.36 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or its vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

The term "REAL MEMBER OF THE PUBLIC" means an individual who is exposed to existing dose pathways at one particular location.

SITE BOUNDARY

1.37 The SITE BOUNDARY shall be that line beyond which the land is not owned, leased or otherwise controlled by the licensee.

UNRESTRICTED AREA

1.38 An UNRESTRICTED AREA shall be any area at or beyond the site boundary to which access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials or any area within the site boundary used for residential quarters or industrial, commercial institutional and/or recreational purposes.

STORAGE PATTERN

1.39 The Region B and C spent fuel racks contain a cell blocking device in every 4th rack location for administrative control. This 4th location will be referred to as the blocked location. A STORAGE PATTERN refers to a blocked location and all adjacent and diagonal cell locations surrounding the blocked location within the respective region.

REFUELING OPERATIONS

SHIELDED CASK

LIMITING CONDITION FOR OPERATION

3.9.16.1 All fuel within a distance L from the center of the spent fuel pool cask set-down area shall have decayed for at least 120 days. The distance L equals the major dimension of the shielded cask. 1 year

APPLICABILITY: Whenever a shielded cask is on the refueling floor.

ACTION:

With the requirements of the above specification not satisfied, do not move a shielded cask to the refueling floor. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.16.1 The decay time of all fuel within a distance L from the center of the spent fuel pool cask set-down area shall be determined to be > 120 days within 24 hours prior to moving a shielded cask to the refueling floor and at least once per 72 hours thereafter. 1 year

9

REFUELING OPERATIONS

SPENT FUEL POOL--REACTIVITY CONDITION

LIMITING CONDITION FOR OPERATION

3.9.18 The Reactivity Condition of the spent fuel pool shall be such that $K_{eff}$ is less-than-or-equal-to 0.95 at all times.

APPLICABILITY: Whenever fuel is in the spent fuel pool.

ACTION:

Borate until $K_{eff} \leq .95$ is reached.

SURVEILLANCE REQUIREMENT

4.9.18.1 Ensure that all fuel assemblies to be placed in Region C (as shown in Figure 3.9-2) of the spent fuel pool are within the enrichment and burn-up limits of Figure 3.9.1 by checking the assembly's design and burn-up documentation. satisfy either:

4.9.18.2 Ensure that the contents of each consolidated fuel storage box to be placed in Region C (as shown in Figure 3.9-2) of the spent fuel pool are within the enrichment and burn-up limits of Figure 3.9-3 by checking the design and burn-up documentation for storage box contents.

4.9.18.3 Ensure that all fuel assemblies to be placed in Region A (as shown in Figure 3.9-2) of the spent fuel pool are within the enrichment and burnup limits of Figure 3.9-4 by checking the assembly's design and burnup documentation.

(a) Fuel assembly enrichment and burnup are within the limits of Figure 3.9-1a by checking the assembly's design and burnup documentation; OR

(b) Fuel assembly enrichment and burnup are within the limits of Figure 3.9-1b by checking the assembly's design and burnup documentation, and borated stainless steel poison pins are install in the assembly's center guide tube and in two diagonally opposite guide tubes.

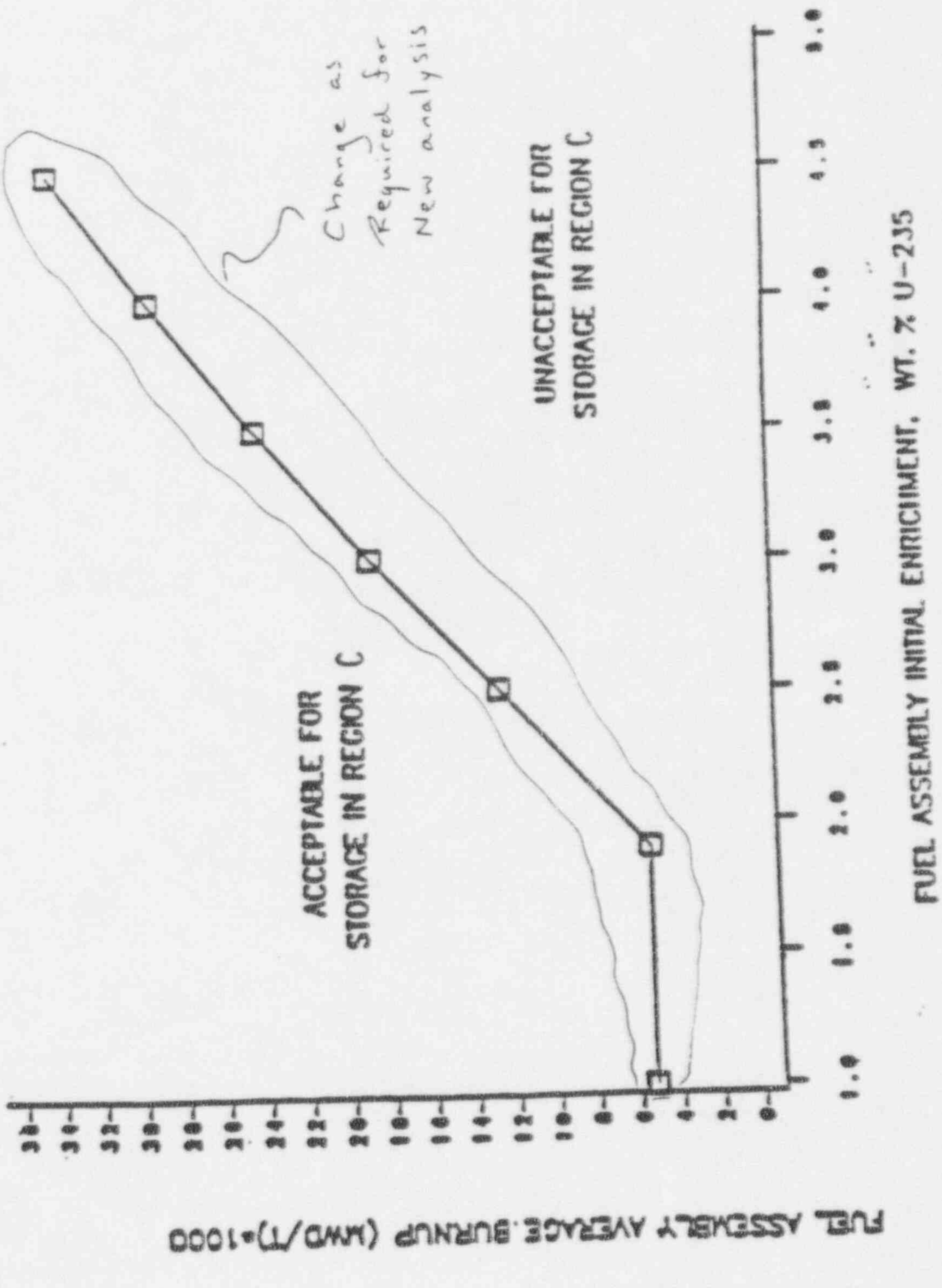



FIGURE 3.9-1 MINIMUM REQUIRED FUEL ASSEMBLY EXPOSURE AS A FUNCTION OF INITIAL ENRICHMENT TO PERMIT STORAGE IN REGION C

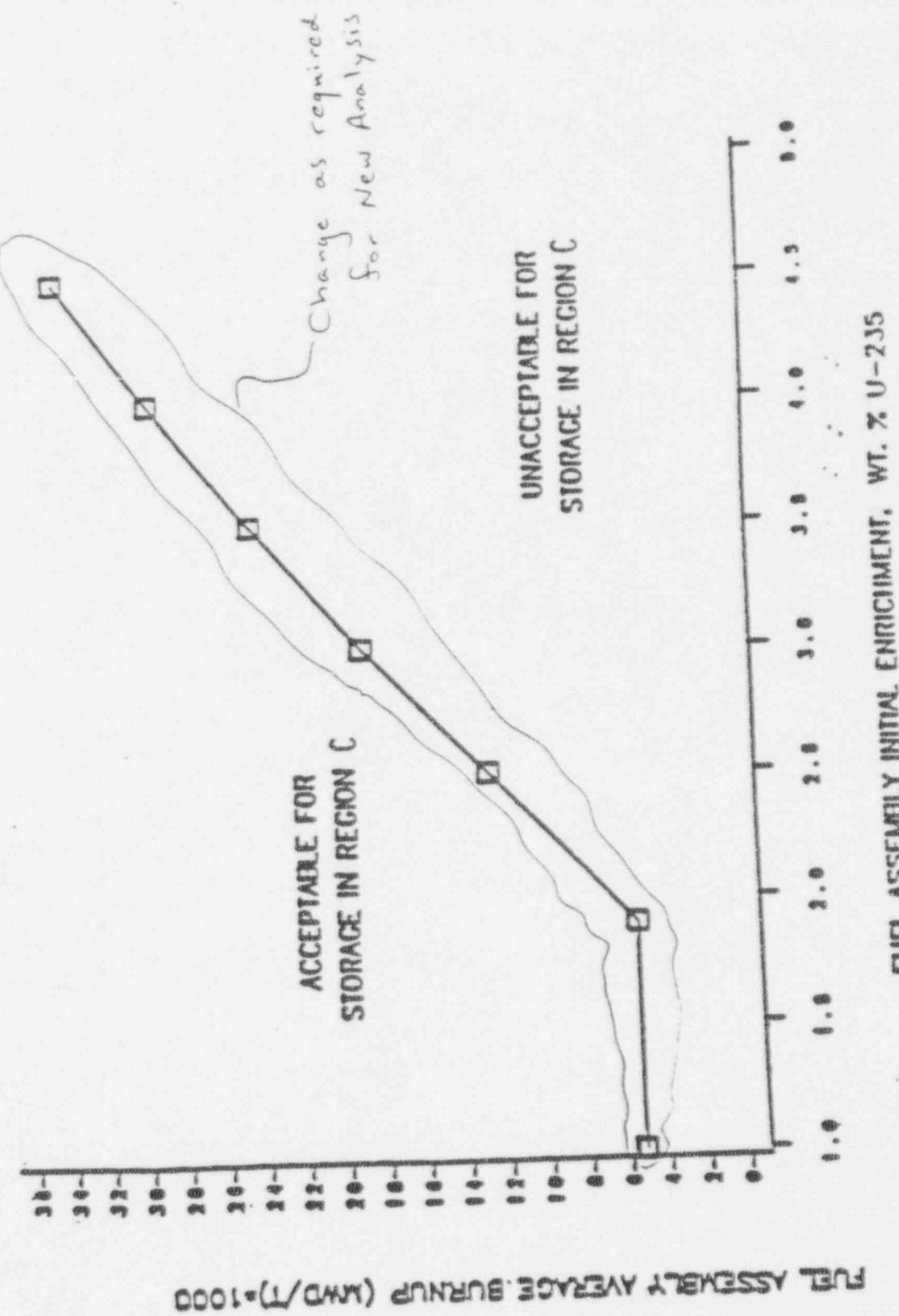
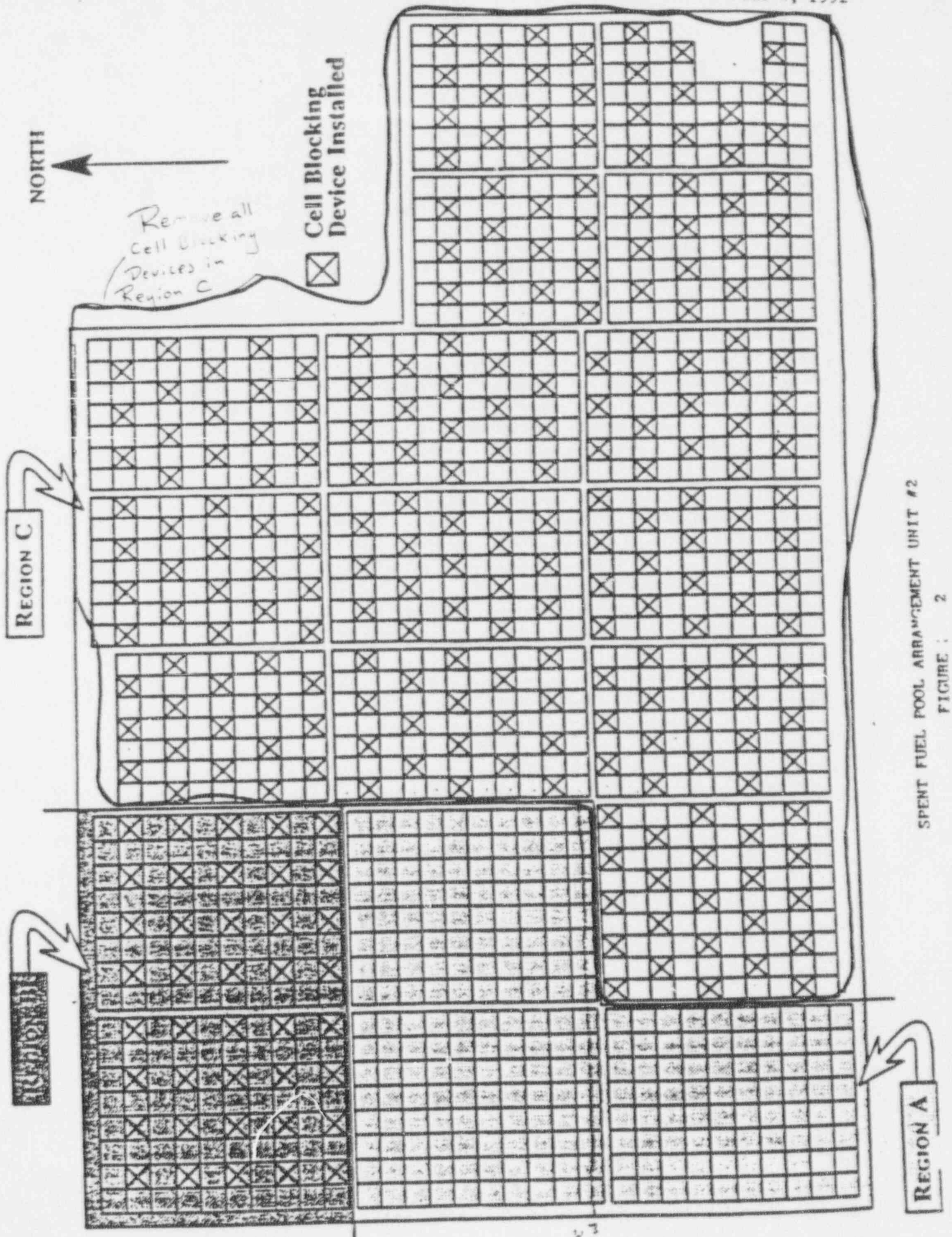



FIGURE 3.9-1b MINIMUM REQUIRED FUEL ASSEMBLY EXPOSURE AS A FUNCTION OF INITIAL ENRICHMENT TO PERMIT STORAGE IN REGION C with Poison Pins Installed




SPENT FUEL POOL ARRANGEMENT UNIT #2

FIGURE : 2

REFUELING OPERATIONS

SPENT FUEL POOL - STORAGE PATTERN

LIMITING CONDITION FOR OPERATION

3.9.19.1 Each STORAGE PATTERN of the Region C spent fuel pool racks shall require either that:

(1) A cell blocking device is installed in those cell locations shown in Figure 3.9-2; or

(2) If a cell blocking device has been removed, all cells of the STORAGE PATTERN must have consolidated fuel in them, including the formerly blocked location; or

(3) Meet both (a) and (b):

(a) If a cell blocking device has been removed, all cells of the STORAGE PATTERN must have consolidated fuel in them except the formerly blocked location.

(b) The formerly blocked location is vacant and a consolidated fuel box or cell blocking device is immediately being placed into the formerly blocked cell.

APPLICABILITY: Fuel in the Spent Fuel Pool

ACTION:

Take immediate action to comply with either 3.9.19.1(1), (2) or (3).

SURVEILLANCE REQUIREMENTS

4.9.19.1 Verify that 3.9.19.1 is satisfied at the following times.

(1) Prior to removing a cell blocking device

(2) Prior to removing a consolidated fuel storage box from its Region C storage location.

REFUELING OPERATIONS

SPENT FUEL POOL - STORAGE PATTERN

LIMITING CONDITION FOR OPERATION

3.9.19.2 Each STORAGE PATTERN of the Region B spent fuel pool racks shall require that:

(1) A cell blocking device is installed in those cell locations shown in Figure 3.9-2; or

(2) If a cell blocking device has been removed, all cells in the STORAGE PATTERN must be vacant of stored fuel assemblies.

APPLICABILITY: Fuel in the spent fuel pool.

ACTION:

Take immediate action to comply with either 3.9.19.2(1) or (2).

SURVEILLANCE REQUIREMENTS

4.9.19.2 Verify that 3.9.19.2 is satisfied prior to removing a cell blocking device.

3/4.9.13 STORAGE POOL RADIATION MONITORING

The OPERABILITY of the storage pool radiation monitors ensures that sufficient radiation monitoring capability is available to detect excessive radiation levels resulting from 1) the inadvertent lowering of the storage pool water level or 2) the release of activity from an irradiated fuel assembly.

3/4.9.14 & 3/4.9.15 STORAGE POOL AREA VENTILATION SYSTEM

The limitations on the storage pool area ventilation system ensures that all radioactive material released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorber prior to discharge to the atmosphere. The OPERABILITY of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

3/4.9.16 SHIELDED CASK

The limitations of this specification ensure that in an event of a cask tilt accident 1) the doses from ruptured fuel assemblies will be within the assumptions of the safety analyses, 2) $K_{eff}$ will remain $\leq$ .95.

3/4.9.17 MOVEMENT OF FUEL IN SPENT FUEL POOL

The limitations of this specification ensure that, in the event of a fuel assembly or a consolidated fuel storage box drop accident into a Region B or C rack location completing a 4-out-of-4 fuel assembly geometry, $K_{eff}$ will remain $\leq$ 0.95.

3/4.9.18 SPENT FUEL POOL - REACTIVITY CONDITION

The limitations described by Figures 3.9-1a, 3.9-1b and 3.9-3 ensure that the reactivity of fuel assemblies and consolidated fuel storage boxes, introduced into the Region C spent fuel racks, are conservatively within the assumptions of the safety analysis.

The limitations described by Figure 3.9-4 ensure that the reactivity of the fuel assemblies, introducted into the Region A spent fuel racks, are conservatively within the assumptions of the safety analysis.

3/4.9.19 SPENT FUEL POOL - STORAGE PATTERN

The limitations of this specification ensure that the reactivity conditions of the Region B and C storage racks and spent fuel pool $K_{eff}$ will remain less than or equal to 0.95.

The Cell Blocking Devices in the 4th location of the Region C storage racks are designed to prevent inadvertent placement and/or storage of fuel assemblies in the blocked locations. The blocked location remains empty to provide the flux trap to maintain reactivity control for fuel assembly storage in any adjacent locations. Only loaded consolidated fuel storage boxes may be placed and/or stored in the 4th location, completing the STORAGE PATTERN, after all adjacent, and diagonal, locations are occupied by loaded consolidated fuel storage boxes.

The Cell Blocking Devices in the 4th location of the Region B storage racks are designed to prevent inadvertent placement and/or storage in the blocked locations. The blocked location remains empty to provide the flux trap to maintain reactivity control for fuel assembly storage in any adjacent locations. Region B is designed for the storage of new assemblies in the spent fuel pool, and for fuel assemblies which have not sustained sufficient burnup to be stored in Region A or Region C.

3/4.9.20 SPENT FUEL POOL - CONSOLIDATION

The limitations of these specifications ensure that the decay heat rates and radioactive inventory of the candidate fuel assemblies for consolidation are conservatively within the assumptions of the safety analysis.

DESIGN FEATURES

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,060 + 700/-0 cubic feet.

## 5.5 EMERGENCY CORE COOLING SYSTEMS

5.5.1 The emergency core cooling systems are designed and shall be maintained in accordance with the original design provisions contained in Section 6.3 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

## 5.6 FUEL STORAGE

CRITICALITY

5.6.1 a) The new fuel (dry) storage racks are designed and shall be maintained with sufficient center to center distance between assemblies to ensure a $k_{eff} \leq .95$. The maximum nominal fuel enrichment to be stored in these racks is 4.50 weight percent of U-235.

b) Region A of the spent fuel storage pool is designed and shall be maintained with a nominal 9.8 inch center to center distance between storage locations to ensure a $K_{eff} \leq .95$ with the storage pool filled with unborated water. Fuel assemblies stored in this region must comply with Figure 3.9-4 to ensure that the design burnup has been sustained.

c) Region B of the spent fuel storage pool is designed and shall be maintained with a nominal 9.8 inch center-to-center distance between storage locations to ensure $K_{eff} \leq .95$ with a storage pool filled with unborated water. Fuel assemblies stored in this region may have a maximum nominal enrichment of 4.5 weight percent U-235. Fuel assemblies stored in this region are placed in a 3 out of 4 STORAGE PATTERN for reactivity control.

d) Region C of the spent fuel storage pool is designed and shall be maintained with a 9.0 inch center to center distance between storage locations to ensure a $K_{eff} \leq .95$ with the storage pool filled with unborated water. Fuel assemblies stored in this region must comply with Figure 3.9-1 to ensure that the design burn-up has been sustained. Fuel assemblies stored in this region are placed in a 3 out of 4 STORAGE PATTERN for reactivity control. The contents of consolidated fuel storage boxes to be stored in this region must comply with Figure 3.9-3. INSERT (A)

e) Region C of the spent fuel storage pool is designed to permit storage of consolidated fuel in the 4th location of the storage rack and ensure a $K_{eff} \leq 0.95$. Placement of consolidated fuel in the 4th location is only permitted if all surrounding cells of the STORAGE PATTERN are occupied by consolidated fuel.

The contents of consolidated fuel storage boxes to be stored in this region must comply with Figure 3.9-3.

INSERT "A"

Fuel assemblies stored in this region must comply with Figures 3.9-1a or 3.9-1b to ensure that the design burn-up has been sustained. Additionally, fuel assemblies utilizing Figure 3.9-1b require that borated stainless steel poison pins are installed in the fuel assembly's center guide tube and in two diagonally opposite guide tubes. The poison pins are solid 0.87 inch O.D. borated stainless steel, with a boron content of 2 weight percent boron.

DESIGN FEATURES

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 22'6".

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 224 storage locations in Region A, 160 storage locations in Region B and 962 storage locations in Region C for a total of 1346 storage locations.*

*This translates into ~~1237~~ 1306 storage locations to receive spent fuel and ~~109~~ 40 storage locations to remain blocked.

Docket No. 50-336
B14470

Attachment 2

Millstone Nuclear Power Station, Unit No. 2

Proposed Revision to Technical Specifications
Spent Fuel Pool Modifications

Retyped Pages of Technical Specifications

May 1993

VENTING

1.35 VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during venting. Vent, used in system names, does not imply a VENTING process.

MEMBER(S) OF THE PUBLIC

1.36 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or its vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries. This category does include persons who use portions of the site for recreational, occupational or other purposes not associated with the plant.

The term "REAL MEMBER OF THE PUBLIC" means an individual who is exposed to existing dose pathways at one particular location.

SITE BOUNDARY

1.37 The SITE BOUNDARY shall be that line beyond which the land is not owned, leased or otherwise controlled by the licensee.

UNRESTRICTED AREA

1.38 An UNRESTRICTED AREA shall be any area at or beyond the site boundary to which access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials or any area within the site boundary used for residential quarters or industrial, commercial institutional and/or recreational purposes.

STORAGE PATTERN

1.39 The Region B spent fuel racks contain a cell blocking device in every 4th rack location for administrative control. This 4th location will be referred to as the blocked location. A STORAGE PATTERN refers to a blocked location and all adjacent and diagonal cell locations surrounding the blocked location within the respective region.

SHIELDED CASK

LIMITING CONDITION FOR OPERATION

3.9.16.1 All fuel within a distance L from the center of the spent fuel pool cask set-down area shall have decayed for at least 1 year. The distance L equals the major dimension of the shielded cask.

APPLICABILITY: Whenever a shielded cask is on the refueling floor.

ACTION:

With the requirements of the above specification not satisfied, do not move a shielded cask to the refueling floor. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.16.1 The decay time of all fuel within a distance L from the center of the spent fuel pool cask set-down area shall be determined to be $\geq$ 1 year within 24 hours prior to moving a shielded cask to the refueling floor and at least once per 72 hours thereafter.

SPENT FUEL POOL--REACTIVITY CONDITION

LIMITING CONDITION FOR OPERATION

3.9.18 The Reactivity Condition of the spent fuel pool shall be such that $K_{eff}$ is less-than-or-equal-to 0.95 at all times.

APPLICABILITY: Whenever fuel is in the spent fuel pool.

ACTION:

Borate until $K_{eff} \leq .95$ is reached.

SURVEILLANCE REQUIREMENT

4.9.18.1 Ensure that all fuel assemblies to be placed in Region C (as shown in Figure 3.9-2) of the spent fuel pool satisfy either:

(a) Fuel assembly enrichment and burnup are within the limits of Figure 3.9-1a by checking the assembly's design and burnup documentation; or

(b) Fuel assembly enrichment and burnup are within the limits of Figure 3.9-1b by checking the assembly's design and burnup documentation, and borated stainless steel poison pins are installed in the assembly's center guide tube and in two diagonally opposite guide tubes.

4.9.18.2 Ensure that the contents of each consolidated fuel storage box to be placed in Region C (as shown in Figure 3.9-2) of the spent fuel pool are within the enrichment and burn-up limits of Figure 3.9-3 by checking the design and burn-up documentation for storage box contents.

4.9.18.3 Ensure that all fuel assemblies to be placed in Region A (as shown in Figure 3.9-2) of the spent fuel pool are within the enrichment and burnup limits of Figure 3.9-4 by checking the assembly's design and burnup documentation.

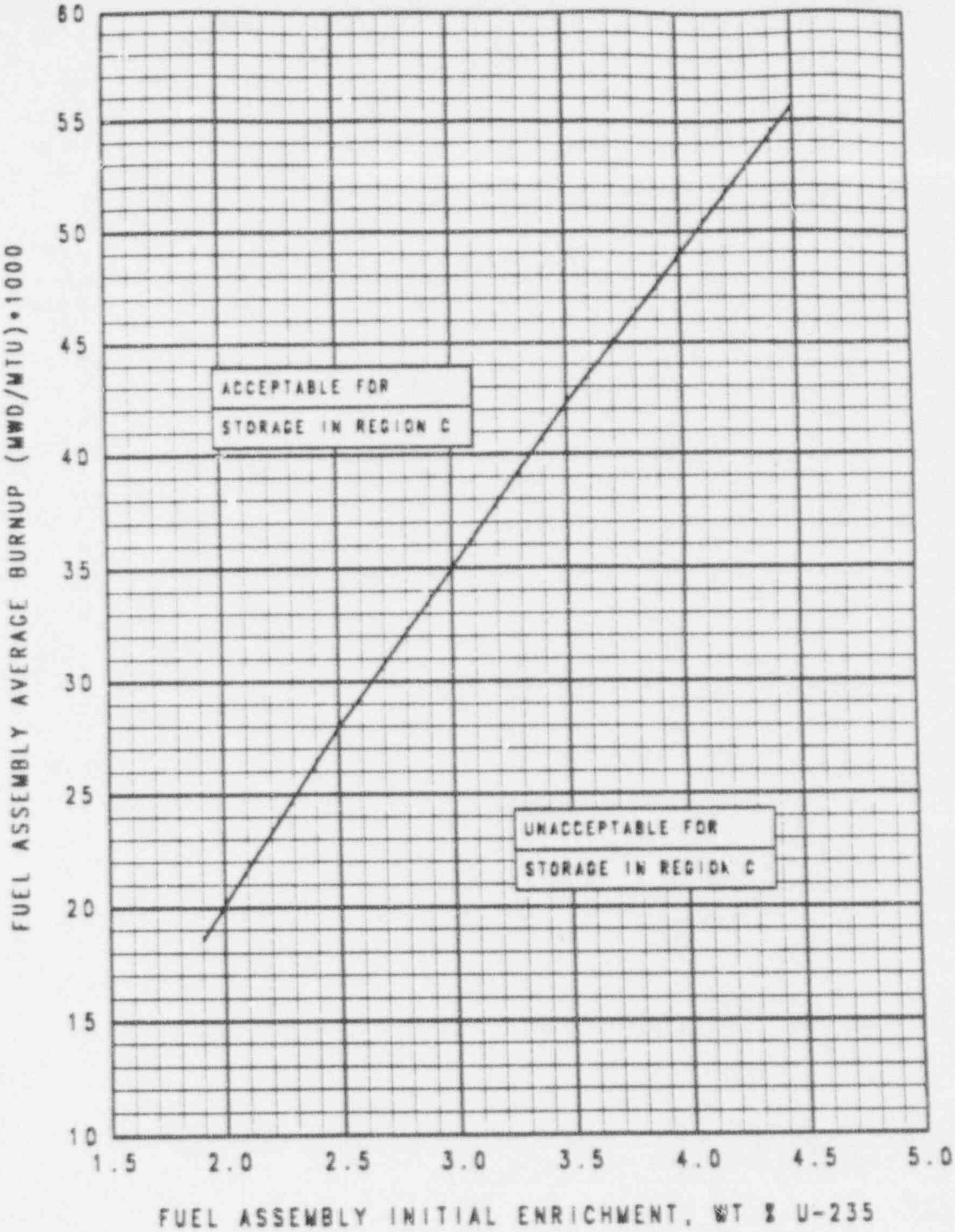



FIGURE 3.9-1A MINIMUM REQUIRED FUEL ASSEMBLY EXPOSURE AS A FUNCTION OF INITIAL ENRICHMENT TO PERMIT STORAGE IN REGION C

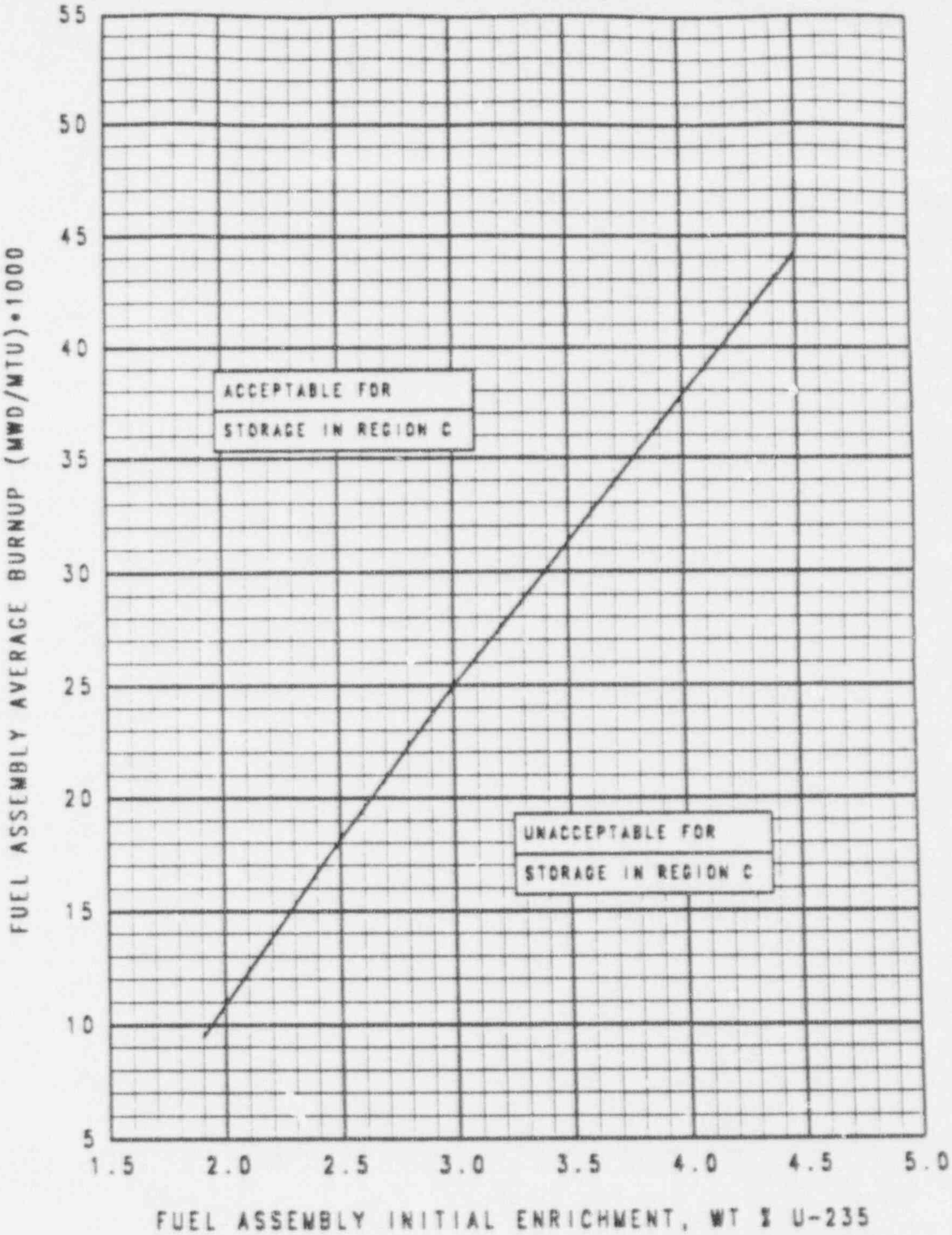
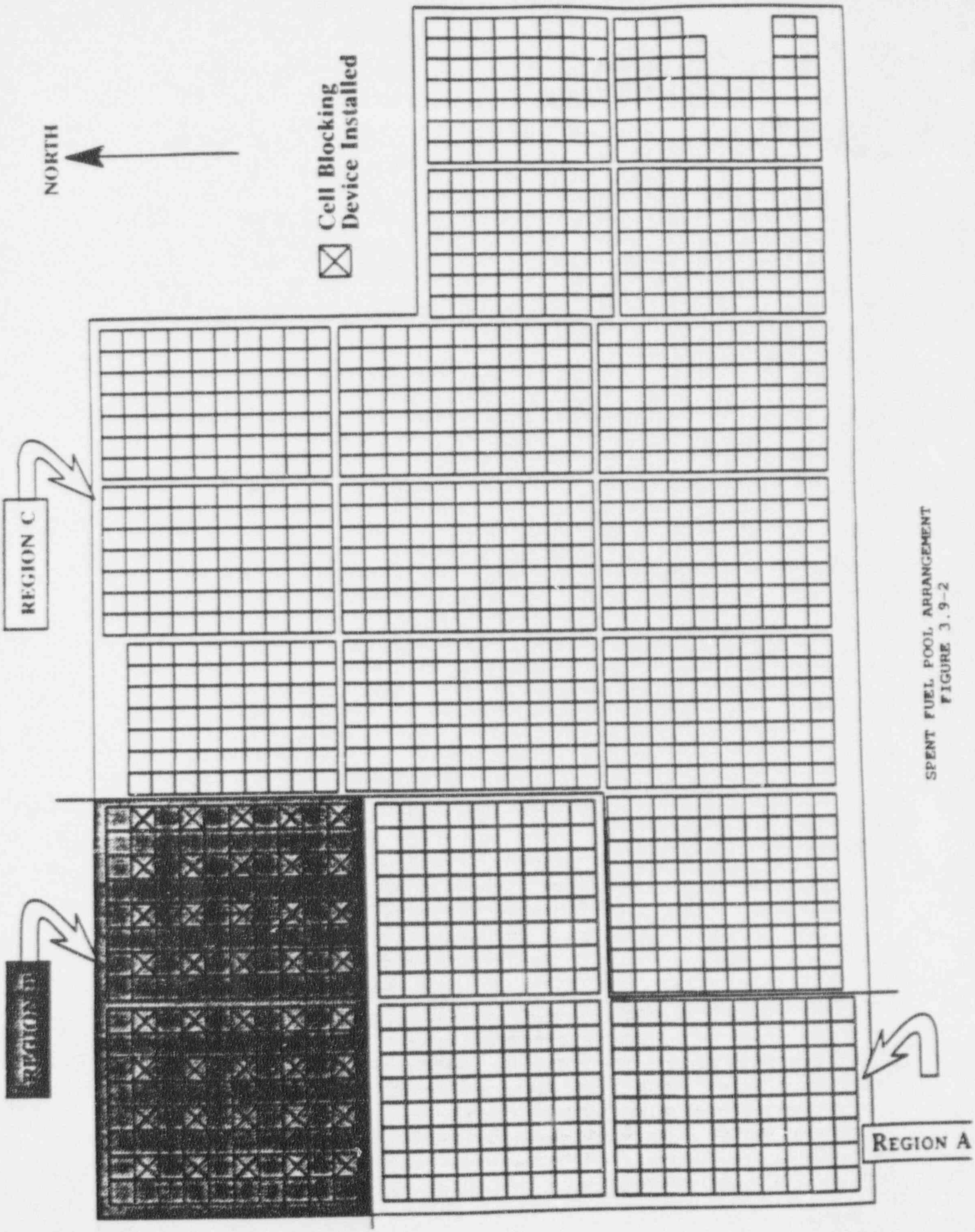



FIGURE 3.9-1B MINIMUM REQUIRED FUEL ASSEMBLY EXPOSURE AS A FUNCTION OF INITIAL ENRICHMENT TO PERMIT STORAGE IN REGION C WITH POISON PINS INSTALLED




SPENT FUEL POOL ARRANGEMENT
FIGURE 3.9-2

SPENT FUEL POOL - STORAGE PATTERN

LIMITING CONDITION FOR OPERATION

3.9.19 Each STORAGE PATTERN of the Region B spent fuel pool racks shall require that:

(1) A cell blocking device is installed in those cell locations shown in Figure 3.9-2; or

(2) If a cell blocking device has been removed, all cells in the STORAGE PATTERN must be vacant of stored fuel assemblies.

APPLICABILITY: Fuel in the spent fuel pool.

ACTION:

Take immediate action to comply with either 3.9.19(1) or (2).

SURVEILLANCE REQUIREMENTS

4.9.19 Verify that 3.9.19 is satisfied prior to removing a cell blocking device.

3/4.9.13 STORAGE POOL RADIATION MONITORING

The OPERABILITY of the storage pool radiation monitors ensures that sufficient radiation monitoring capability is available to detect excessive radiation levels resulting from 1) the inadvertent lowering of the storage pool water level or 2) the release of activity from an irradiated fuel assembly.

3/4.9.14 & 3/4.9.15 STORAGE POOL AREA VENTILATION SYSTEM

The limitations on the storage pool area ventilation system ensures that all radioactive material released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorber prior to discharge to the atmosphere. The OPERABILITY of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

3/4.9.16 SHIELDED CASK

The limitations of this specification ensure that in an event of a cask tilt accident 1) the doses from ruptured fuel assemblies will be within the assumptions of the safety analyses, 2) $K_{eff}$ will remain $\leq$ .95.

3/4.9.17 MOVEMENT OF FUEL IN SPENT FUEL POOL

The limitations of this specification ensure that, in the event of a fuel assembly or a consolidated fuel storage box drop accident into a Region B or C rack location completing a 4-out-of-4 fuel assembly geometry, $K_{eff}$ will remain $\leq$ 0.95.

3/4.9.18 SPENT FUEL POOL - REACTIVITY CONDITION

The limitations described by Figures 3.9-1a, 3.9-1b, and 3.9-3 ensure that the reactivity of fuel assemblies and consolidated fuel storage boxes, introduced into the Region C spent fuel racks, are conservatively within the assumptions of the safety analysis.

The limitations described by Figure 3.9-4 ensure that the reactivity of the fuel assemblies, introducted into the Region A spent fuel racks, are conservatively within the assumptions of the safety analysis.

3/4.9.19 SPENT FUEL POOL - STORAGE PATTERN

The limitations of this specification ensure that the reactivity condition of the Region B storage racks and spent fuel pool $K_{eff}$ will remain less than or equal to 0.95.

The Cell Blocking Devices in the 4th location of the Region B storage racks are designed to prevent inadvertent placement and/or storage in the blocked locations. The blocked location remains empty to provide the flux trap to maintain reactivity control for fuel assembly storage in any adjacent locations. Region B is designed for the storage of new assemblies in the spent fuel pool, and for fuel assemblies which have not sustained sufficient burnup to be stored in Region A or Region C.

3/4.9.20 SPENT FUEL POOL - CONSOLIDATION

The limitations of these specifications ensure that the decay heat rates and radioactive inventory of the candidate fuel assemblies for consolidation are conservatively within the assumptions of the safety analysis.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 10,060 + 700/-0 cubic feet.

## 5.5 EMERGENCY CORE COOLING SYSTEMS

5.5.1 The emergency core cooling systems are designed and shall be maintained in accordance with the original design provisions contained in Section 6.3 of the FSAR with allowance for normal degradation pursuant to the applicable Surveillance Requirements.

## 5.6 FUEL STORAGE

CRITICALITY

5.6.1 a) The new fuel (dry) storage racks are designed and shall be maintained with sufficient center to center distance between assemblies to ensure a $k_{eff} \leq .95$. The maximum nominal fuel enrichment to be stored in these racks is 4.50 weight percent of U-235.

b) Region A of the spent fuel storage pool is designed and shall be maintained with a nominal 9.8 inch center to center distance between storage locations to ensure a $K_{eff} \leq .95$ with the storage pool filled with unborated water. Fuel assemblies stored in this region must comply with Figure 3.9-4 to ensure that the design burnup has been sustained.

c) Region B of the spent fuel storage pool is designed and shall be maintained with a nominal 9.8 inch center-to-center distance between storage locations to ensure $K_{eff} \leq .95$ with a storage pool filled with unborated water. Fuel assemblies stored in this region may have a maximum nominal enrichment of 4.5 weight percent U-235. Fuel assemblies stored in this region are placed in a 3 out of 4 STORAGE PATTERN for reactivity control.

d) Region C of the spent fuel storage pool is designed and shall be maintained with a 9.0 inch center to center distance between storage locations to ensure a $K_{eff} \leq .95$ with the storage pool filled with unborated water. Fuel assemblies stored in this region must comply with Figures 3.9-1a or 3.9-1b to ensure that the design burn-up has been sustained. Additionally, fuel assemblies utilizing Figure 3.9-1b require that borated stainless steel poison pins are installed in the fuel assembly's center guide tube and in two diagonally opposite guide tubes. The poison pins are solid 0.87 inch O.D. borated stainless steel, with a boron content of 2 weight percent boron.

e) Region C of the spent fuel storage pool is designed to permit storage of consolidated fuel and ensure a $K_{eff} \leq 0.95$. The contents of consolidated fuel storage boxes to be stored in this region must comply with Figure 3.9-3.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 22'6".

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 224 storage locations in Region A, 160 storage locations in Region B and 962 storage locations in Region C for a total of 1346 storage locations.*

*This translates into 1306 storage locations to receive spent fuel and 40 storage locations to remain blocked.

Attachment 3

Millstone Nuclear Power Station, Unit No. 2

# Criticality Safety Analysis Summary
# Spent Fuel Pool Modifications

May 1993

# Millstone Nuclear Power Station, Unit No. 2
## Criticality Safety Analysis Summary
## Spent Fuel Pool Modifications

This attachment summarizes the results of criticality safety analyses of the Millstone Unit No. 2 spent fuel pool (SFP) storage racks. These calculations utilized the CASMO-3 computer code augmented by the three-dimensional NITAWL-KENO-5a model with the 27-group SCALE cross-section library. Sections of the storage cells are identified in 3 regions. Each of these sections is addressed below:

### Region A

Region A, (utilizing all of the cells in a 4-of-4 cell arrangement with credit for fuel burnup) is not changed from the previous analysis. None of the rearrangements affect the results of the prior analysis and the burnup-limit curve for Region A remains valid.

### Region B

Region B, (utilizing three cells containing fuel with the fourth cell empty of fuel bearing material) also is not changed from the previous analysis. None of the rearrangements affect the results of the prior analysis and the previous analysis for Region B remains valid.

### Temperature Effects

In Regions A and B, the temperature coefficient of reactivity is negative. However, for Region C, the temperature coefficient of reactivity is positive. For Region C, a normal maximum temperature was taken as 150°F, and temperatures above 150°F, should they occur, were considered accident conditions where credit for soluble boron is permitted. For the highest accident SFP temperature, 0.95 $K_{eff}$ was not exceeded and therefore no credit for soluble boron is necessary.

### Region C
### (with Poison Pins)

Region C is designed to use borated stainless steel (B-SS) rodlets or pins inserted into the control rod thimbles (3 rodlets per assembly). Analysis for this arrangement resulted in a maximum $K_{eff}$ of 0.940 including calculational and manufacturing uncertainties. The analysis also includes the effect of axially distributed burnup in the assembly. Table 1 summarizes the calculations for Region C. Calculations were also made to define the burnup limit curve as a function of the initial enrichment. Figure 1 is the limiting burnup curve, yielding at each enrichment the same maximum $K_{eff}$ (0.940). This burnup-limit

curve identifies the burnups required for acceptable storage of spent fuel in Region C with poison pins.

The B-SS rodlets are aligned diagonally within the fuel assembly. Calculations showed that there is no difference (within the normal statistical variation of KENO-5a) for the various possible orientations within the storage rack. Therefore, the racks can safely accept assemblies with the specified rodlets, regardless of orientation, provided they meet the burnup requirements defined in Figure 1.

## Region C
(No poison pins)

Region C is designed to safely accommodate spent fuel without any poison rodlets and utilizing all cells (4-of-4 arrangement). This requires a higher burnup and the burnup limit curve is shown in Figure 1. The maximum calculated $K_{eff}$ in Region C with no poison pins is 0.9459, as indicated in Table 1, including uncertainties and the estimated reactivity consequence of axial burnup distributions.

The reactivity of Region C with poison pins and Region C with no poison pin storage cells are very nearly the same. Therefore, these storage cells are interchangeable and may be intermixed or utilized in any desired configuration in Region C.

## Consolidated Fuel

Calculations were also made for consolidated fuel (2-to-1 ratio) at one enrichment. This calculation reasonably confirmed the Combustion Engineering (CE) calculation and lends credibility to the CE calculations for consolidated fuel at other enrichments. Consolidated fuel bundles would therefore remain acceptable for storage in any Region C location, within the burnup-limits reported by CE (current Technical Specification Figure 3.9-3).

## Interface Calculations

Calculations confirm that there are no adverse reactivity effects at the interfaces between any of the rack regions.

## New Fuel Elevator

The new fuel elevator is located along the east wall of the SFP. Calculations (KENO-5a) of this area of the pool showed that there is virtually no interaction between the spent fuel and fresh fuel of 4.5% enrichment in the new fuel elevator. Consequently, the new fuel elevator may be used without any restrictions other than the enrichment limit of 4.5%.

## Accident Conditions

No accident conditions have been identified that would result in exceeding the regulatory limit on reactivity ($K_{eff}$ of 0.95), with the exception of the accidental misloading of a fresh fuel assembly of the highest permissible reactivity into a cell in Region C intended to receive spent fuel. Calculations, however, show that the soluble boron in the pool water (800 ppm per Technical Specification Limit) is more than adequate to compensate for this accident condition. Credit for soluble boron is permissible under accident conditions (single failure criterion) and will assure the reactivity is maintained within the regulatory limit.

Table 1

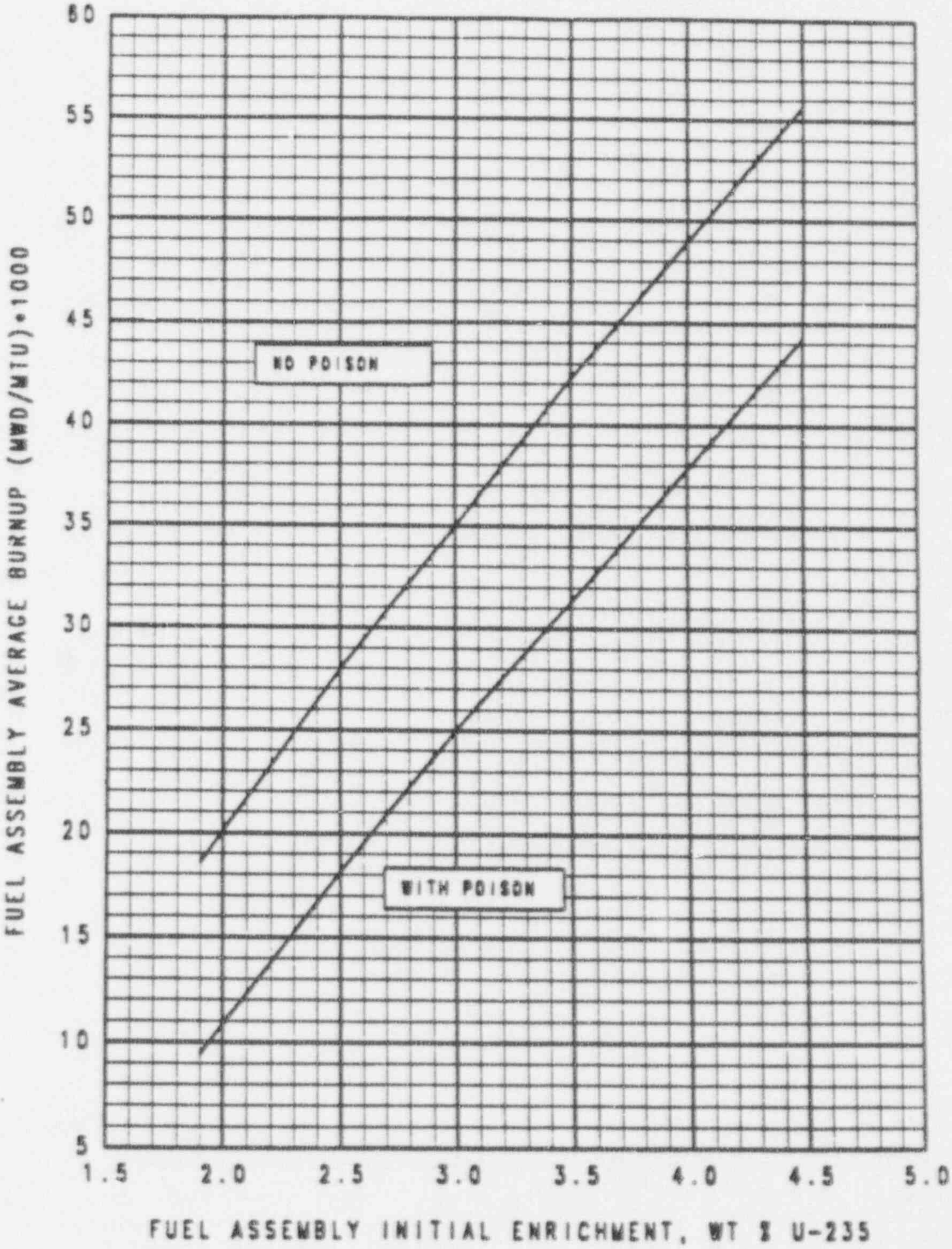
Summary of Criticality Safety Calculations for Alternative Storage Arrangements in Millstone Unit 2

| Item | Region C (With Poison Pins) | Region C (No Poison Pins) |
|---|---|---|
| Calculated $K_{eff}$ | 0.9252 | 0.9243 |
| Temperature | 150°F | 150°F |
| Calculational Method | CASMO-3 | CASMO-3 |
| Bias | 0.0000 | 0.0000 |
| Uncertainties: | | |
| Uncertainty in Bias | ± 0.0024 | ± 0.0024 |
| Rodlet Diameter | ± 0.0012 | NA |
| Rodlet B-10 loading | ± 0.0008 | NA |
| Enrichment | ± 0.0035 | ± 0.0054 |
| $UO_2$ Density | ± 0.0054 | ± 0.0039 |
| Lattice Spacing | ± 0.0052 | ± 0.0065 |
| SS Wall Thickness | ± 0.0024 | ± 0.0025 |
| Uncertainty in Depletion Calculations[1] | ± 0.0119 | ± 0.0175 |
| Statistical Average | ± 0.0150 | ± 0.0201 |
| Axial Burnup Distribution[1] | 0.0 | ± 0.0015 |
| Calculated Reactivity | 0.9252 ± 0.0150 | 0.9258 ± 0.0201 |
| Maximum reactivity | 0.9402 | 0.9459 |

(1) Evaluated for 3% enriched Westinghouse fuel at 25 MWD/KgU for Region C with poison pins and 35 MWD/KgU for Region C with no poison pins. Other enrichments and burnups evaluated for appropriate values, all yielding the same maximum reactivity ($K_{eff}$).

FIGURE 1

MINIMUM REQUIRED FUEL ASSEMBLY EXPOSURE AS A FUNCTION OF INITIAL ENRICHMENT TO PERMIT STORAGE IN REGION C



Docket No. 50-336
B14470

Attachment 4

Millstone Nuclear Power Station, Unit No. 2

Safety Assessment Summary for Criticality and Fuel Handling
Spent Fuel Pool Modifications

May 1993

Millstone Nuclear Power Station, Unit No. 2

Safety Assessment Summary for Criticality and Fuel Handling
Spent Fuel Pool Modifications

## 1.0 Safety Assessment

### 1.1 Safety Assessment Conclusions

The proposed change does not constitute an Unreviewed Safety Question (USQ) and is safe.

### 1.2 Description of the Change

The proposed changes are to Region C of the Millstone Unit No. 2 spent fuel pool (SFP). The 234 cell blockers will be removed to allow an additional 234 storage locations for spent fuel.

To allow the removal of the blocking devices, borated stainless steel rodlets must be placed in fuel assemblies to be stored in Region C, unless the fuel assemblies have enough burnup that the poison rodlets are not needed. To determine this, a curve of assembly average enrichment versus assembly average burnup is provided to determine whether an assembly qualifies for Region C storage without the need for any poison rodlets. A separate curve of assembly average enrichment versus assembly average burnup is provided to determine whether an assembly qualifies for Region C storage with the poison rodlets. If an assembly does not meet one of the two curves, then storage is not allowed in Region C under any circumstances.

An assembly that needs poison rodlets must have three poison rodlets installed in three guide tubes that are directly in line; that is, the center guide tube and any two diagonally opposite guide tubes. Orientation of the fuel assembly in the Region C racks does not matter. The rodlets are 0.87 inch OD borated stainless steel, with a boron content of 2 weight percent. Each poison rodlet is inserted into the fuel assembly guide tube and does not protrude above the top of the fuel assembly guide tube. The poison rodlet shadows all of the active fuel height except for a small portion of the active fuel at the bottom. Under worst case conditions, less than 3 inches of the active fuel height at the bottom of the fuel stack would not be shadowed by the poison pins. The OD of the poison rodlets is less than that of a CEA. The length of the poison finger is about 0.75 inch longer than a CEA. The weight of three poison rodlets is less than that of a CEA.

1.3 Aspects of the Change Evaluated

This evaluation addresses the criticality aspects and the fuel handling aspects of the proposed changes.

1.4 Malfunctions Evaluated

The criticality analysis evaluates the following malfunctions:

(a) criticality impact of a dropped fuel assembly
(b) criticality impact of a dropped cask
(c) criticality impact of a fresh 4.5 w/o fuel assembly accidentally placed in Region C with no poison pins

1.5 References

(1) Criticality Safety Analyses of the Millstone Unit No. 2 SFP with alternate arrangements and postulated gaps.

(2) Evaluation of the new ANF fuel design for storage in the SFP.

(3) Millstone Unit No. 2 FSAR Section 14.7.4 and 14.7.5.

## 2.0 Unreviewed Safety Question

2.1 Unreviewed Safety Question Determination

2.1.1 List of Accidents Evaluated

Per Reference (3), the fuel handling drop accident and the cask drop accident are the two accidents in the SFP that could be affected.

2.1.2 Effect on the Probability of Occurrence of Previously Evaluated Accidents

The removal of the cell blockers and the installation of poison pins will have no effect on the probability of occurrence of a fuel handling accident or a cask drop.

2.1.3 Effect on the Probability of Occurrence of Previously Evaluated Malfunction of Equipment Important to Safety

Previously analyzed malfunctions from the criticality analysis are: the cask drop accident, fuel assembly drop accident, and the accidental misloading of a fresh 4.5 w/o fuel assembly into Region C. The removal of the cell blockers and the installation of poison pins will have no effect on the probability of occurrence of previously evaluated malfunctions of equipment important to safety.

2.1.4 Effect on the Consequences of the Previously Evaluated Accidents

There is no change in the consequences of the dropped fuel assembly accident since the installation of poison pins will not change the damage caused by the fuel assembly drop. Therefore, there is no effect on the consequences of the previously evaluated accidents.

2.1.5 Effect on the Consequences of the Previously Evaluated Malfunctions

There is no effect on the consequences of previously evaluated malfunctions. Reference (1) shows that ≤ .95 $K_{eff}$ is maintained with credit for soluble boron, for the cask drop accident, fuel assembly drop accident, and the accidental misloading of a fresh 4.5 w/o fuel assembly into Region C.

2.2 Potential for a New Unanalyzed Accident

2.2.1 Possibility of an Accident of a Different Type than Previously Evaluated

The removal of the cell blockers and the installation of poison pins does not create the possibility of an accident of a different type than previously evaluated.

2.2.2 Possibility of a Malfunction of a Different Type than Previously Evaluated

The only possible new malfunction would be the inadvertent removal of poison pins or not placing poison pins in an assembly that requires them. Inadvertent removal of the poison pins is not credible since special tooling is required to remove them, effectively making them no different than a fixed poison. Further, not placing poison pins in an assembly that requires them is effectively a malfunction that is already analyzed, since a fresh 4.5 w/o fuel assembly (with no poison pins) is placed in Region C to verify the $K_{eff}$ is < .95 with soluble boron credit. Therefore, there is no possibility of a malfunction of a different type than previously evaluated.

2.3 Impact on Margin of Safety

The margin of safety is the .95 $K_{eff}$ limit on the SFP during normal and accident conditions. References (1) and (2) show that $K_{eff}$ will be less than .95 under all normal and accident conditions;

therefore, there is no impact on the margin of safety for criticality.

## 3.0 Safety Determination

Based on the fact that no USQ exists and based on the scope of review, the proposed change is safe.

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Attachment 5

Millstone Nuclear Power Station, Unit No. 2

Safety Assessment Summary for the Mechanical, Material, Structural
Thermal/Pool Cooling, and Accident Considerations
Spent Fuel Pool Modifications

May 1993

Millstone Nuclear Power Station, Unit No. 2

Safety Assessment Summary for the Mechanical, Material, Structural Thermal/Pool Cocling, and Accident Considerations Spent Fuel Pool Modifications

## 1.0 SUMMARY INFORMATION

This assessment will address the mechanical, materials, structural, thermal/pool cooling and accident considerations resulting from the proposed change.

### 1.1 Safety Assessment Conclusions

Per Northeast Utilities procedures and in accordance with the provisions of 10CFR50.59 and 50.92, respectively, the proposed technical specification changes are safe and are not an Unreviewed Safety Question and do not constitute a significant hazards consideration, respectively.

### 1.2 Description of the Change

The Millstone Unit No. 2 Region C unpoisoned spent fuel racks were originally licensed for 75 percent storage occupancy of intact spent fuel in 728 of the 962 cells (234 cells were blocked off). This change proposes to introduce poisoned rodlets into the stored fuel in Region C to permit removal of the cell blockers and provide 234 additional spent fuel storage locations.

### 1.3 Aspects of the Change Evaluated

- Mechanical/Material design of the rodlets
- Seismic/Structural, Thermal Hydraulic consideration of Fuel/ Fuel Rack and Fuel Pool Structure
- Pool Cooling consideration associated with the increase in intact fuel storage capacity
- Radiological Consideration associated with the increase in intact fuel storage capacity

### 1.4 Malfunction Evaluated

Fuel/Fuel Rack/Fuel Pool Qualifications:

- Mechanical Design Configuration of rodlet
- Thermal Consideration of fuel, fuel rack, and pool cooling
- Structural Effect of the weight of the rodlets on the fuel/fuel rack/fuel pool interfaces and drop qualifications

1.5 References

CE Licensing Report of Millstone Unit No. 2
Millstone Unit No. 2 PTSCR 2/8/85
Millstone Unit No. 2 Amendment Submittal
NRC Amendment Approval No. 128
Spent Fuel Seismic Report Rev. 01
Spent Fuel Rack Structural Report Rev. 01
Fuel Pool Cooling Report Rev. 02
[Vendor] Report Criticality Safety Evaluation for Rodlets
Millstone Unit No. 2 FSAR Chapter 14
NUSCO RAB Calculation
[Vendor] Manufacturing Program/Engineering Package/Certification of Tests
NUSCO Specification
ASTM A 887-89 Standard Specification for Borated Stainless Steel for Nuclear Applications
ASTM A 484-91 Standard Specification for General Requirements for Stainless Steel and Heat Resisting Bars, Billets, Forgings and Strip

**2.0 Unreviewed Safety Question Determination**

2.1 Impact on Previously Evaluated Accidents

No impact to any previously evaluated accidents or malfunctions of equipment important to safety results from this change.

2.1.1 List of Accidents Evaluated

Design Bases (FSAR)
Fuel Handling Accident FSAR Section 14.7.4
Cask Drop Accident FSAR Section 14.7.5

2.1.2 Effect on the Probability of Occurrence of Previously Evaluated Accidents

Design Bases Accidents have been evaluated and determined to be unaffected by the change. The initiation of either the fuel handling and/or cask drop accidents are unrelated to this proposed change. Therefore, this change does not involve a significant increase in the probability of an accident previously evaluated.

2.1.3 Effect on the Probability of Occurrence of a Previously Evaluated Malfunction of Equipment Important to Safety

Fuel/fuel rack and fuel pool qualifications have been evaluated for malfunctions and determined to be unaffected by the change. The initiation of any of the malfunctions

identified and evaluated are unrelated to this proposed change.

2.1.4 Effect on the Consequences of the Previously Evaluated Accidents

Design Bases Accidents have been evaluated and determined to be unaffected by this change. The referenced Fuel Handling Accident (2.1.1) relates to the radiological consequences of freshly discharged fuel that is dropped to the pool floor and results in the rupture of 14 fuel rods. The referenced Cask Drop Accident (2.1.1) has been reanalyzed for the radiological consequences of the increased fuel storage capacity in the "targeted footprint area" and determined to be bounded by the previously evaluated accident parameters. Therefore, this change does not involve a significant increase in the consequences of an accident previously evaluated.

2.1.5 Effect on the Consequences of a Previously Evaluated Malfunction of Equipment Important to Safety

Fuel/fuel rack and fuel pool qualifications have been evaluated and determined to be unaffected by this change. The mechanical design configuration of the rodlets is consistent with the shape, size, and weight of a CEA. The material (borated stainless steel) is ASTM approved and licensed by the NRC for use in spent fuel storage technologies and spent fuel pools. The thermal considerations of fuel are unaffected by the presence of the rodlet because the guide tube is designed for the presence of a CEA; therefore, it is not a primary coolant flow area. The fuel rack normal thermal cooling and malfunction blocked cooling scenarios are unaffected by the presence of the rodlet in the fuel assembly. The fuel pool cooling scenarios of normal, abnormal, single-active failure, and loss of forced cooling are unaffected by the increase in intact fuel storage resulting from the rodlets because License Amendment No. 128, dated March 31, 1988, and the Fuel Pool Cooling Report, dated February 28, 1985, accounted for an intact spent fuel inventory decay heat history to a maximum of 1965 fuel assemblies. Therefore, the pool cooling scenarios are bounded by previous licensed analysis. The structural effect of the weight of the rodlet on the fuel/fuel rack/fuel pool structural interfaces and drop qualifications are unaffected because with respect to the fuel, the combined weight of three rodlets is less than the weight of a CEA. With respect to the fuel rack and fuel pool

structural interfaces, they are bounded by the weight of a consolidated fuel storage box (~2500 lbs.) in every one of the 1346 storage locations per License Amendment No. 128, dated March 31, 1988.

2.2 Potential for a New Unanalyzed Accident

No potential for any new unanalyzed accidents results from this change.

2.2.1 Possibility of an Accident of a Different Type than Previously Evaluated

All failure modes that cause an accident have been evaluated (design bases, fuel handling, and cask drop accidents). A new failure mode that could represent a new unanalyzed accident is not apparent. Therefore, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

2.2.2 Possibility of a Malfunction of a Different Type than Previously Evaluated

All conditions that constitute a malfunction have been evaluated (fuel/fuel rack/fuel pool structural interface qualifications). A new condition that represents a malfunction is not apparent. Therefore, no new malfunction has been created.

2.3 Impact on the Margin of Safety

The mechanical properties and weight of the fuel assemblies remain essentially unchanged. The fuel racks are freestanding and with the inclusion of the weight of the three (3) rodlets per assembly, the original mechanical and thermal analyses of the fuel assembly/fuel rack and fuel pool building interfaces currently licensed by License Amendment No. 128, dated March 31, 1988, remain valid and conservative. Therefore, this change does not involve a significant reduction in a margin of safety.

## 3.0 Safety Determination

This change is SAFE and is not an Unreviewed Safety Question or a significant hazards consideration. All of the mechanical design qualifications, attributes, and parameters of the fuel racks and fuel pool to store nuclear spent fuel, maintain the fuel assemblies coolable and in a safe subcritical configuration of $K_{eff} \leq .95$ remain valid, unaffected, and unchanged.