c. A nominal center to center distance between fuel assemblies placed in the fuel storage racks of 10.82 inch for Region 1, with 9.02 inch for Regions 2 and 3;

d. Fuel assembly storage shall comply with the requirements of Specification 3.9.14.

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

a. Fuel assemblies having a maximum U-235 enrichment of ~~4.5~~ 5.00 weight percent; with a tolerance of 0.05 weight percent

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in UFSAR Section 9.12;

c. $K_{eff} \leq$ ~~0.95~~ 0.97 if moderated by aqueous foam, which includes an allowance for uncertainties as described in UFSAR Section 9.12;

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

5.3.2 DRAINAGE

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 750' - 10".

5.3.3 CAPACITY

The fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1627 fuel assemblies.

ATTACHMENT A-1

Beaver Valley Power Station, Unit No. 1
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The following is a list of the affected pages:

Affected Pages: 5-5

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 4.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 9370 cubic feet at a nominal Tavg of 525°F.

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 The spent fuel storage racks are designed in a three region configuration. Region 1 racks are of the poisoned flux-trap type with the storage cells arranged at 10.82 inch pitch. The Region 2 and Region 3 racks are of the poisoned non-flux trap construction with a cell-to-cell pitch of 9.02 inches. The fuel will be stored in accordance with the provisions described in UFSAR Sections 3.3 and 9.12 to ensure a keff equivalent to ≤ 0.95 with the storage pool filled with unborated water.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 750' - 10".

INSERT 1

(Proposed Wording)

INSERT 1

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

a. Fuel assemblies having a maximum U-235 enrichment of 5.00 weight percent with a tolerance of + 0.05 weight percent;

b. $K_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in UFSAR Section 9.12;

c. $K_{eff} \leq 0.98$ if moderated by aqueous foam, which includes an allowance for uncertainties as described in UFSAR Section 9.12;

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

ATTACHMENT B

Beaver Valley Power Station, Unit No. 1
Proposed Technical Specification Change No. 241
5 W/O NEW FUEL ENRICHMENT

A. DESCRIPTION OF AMENDMENT REQUEST

The proposed amendment would modify the technical specifications based on our previous request (letter dated September 9, 1996) currently under NRC review concerning modification of the Unit 1 technical specification (TS) design feature section to reflect the Improved Standard Technical Specifications (ISTS) of NUREG-1431. This change would revise Design Feature 5.3.1, Criticality, where the new fuel (fresh fuel) rack enrichment limit specified in Section 5.3.1.2.a would be increased to 5 weight percent (w/o) and the maximum enrichment limit would be modified by adding the words "with a tolerance of 0.05 weight percent." In addition, the k_{eff} limit in Section 5.3.1.2.c would be changed to $\leq$ 0.98 for aqueous foam. These changes are provided in Attachment A.

Attachment A-1 incorporates the new Specification 5.3.1.2 fuel rack information into the current Specification 5.6.1, as an option, in the event the previously submitted amendment is not issued before this amendment request is approved. The justification for the previous changes to Specification 5.3.1.2 is provided in Attachment D which includes the modified Technical Specification Change No. 234 and 107 Attachment B with the new fuel rack discussion in italics.

B. BACKGROUND

Design Feature 5.3.1 provides the new fuel storage rack design limits. The new fuel racks provide dry storage for 70 fuel assemblies arranged in a 5 x 14 array with a 21 inch lattice spacing. The current criticality analysis provided for a new fuel rack enrichment limit of 4.5 w/o and was submitted by letter dated March 9, 1987. The spent fuel racks have been evaluated to address fuel enriched to 5.00 w/o + 0.05 w/o as detailed in the criticality analysis of record submitted by letter dated November 2, 1992, as supplemented by letter dated June 28, 1993. The next cycle of operation will require an enrichment greater than 4.5 w/o to meet the energy requirements; therefore, a new fuel criticality analysis was initiated to provide a basis for increased enrichment by taking credit for the margin available between the current analyzed maximum k_{eff} and the new fuel rack k_{eff} limits.

C. JUSTIFICATION

Changing to higher enriched fuel allows the transition to higher burnup fuel. Future core designs may feature longer cycles, higher capacity factors, and ultimately, higher discharge burnups. Using higher discharge burnup fuel in the reactor core

design reduces the number of fuel assemblies required per reload. This will save money by paying less for fuel fabrication and by using less spent fuel storage space.

Attachment C, "Criticality Analysis of the Beaver Valley 1 Fresh Fuel Racks," was performed to evaluate a new fuel rack enrichment limit of 5.00 w/o + 0.05 w/o. The analysis results indicate that for fuel enriched to 5.00 w/o + 0.05 w/o for both the full density (1.0 gm/cm^3) and the optimum moderation (0.07 gm/cm^3) conditions the maximum k_{eff} including uncertainties at the 95/95 probability/confidence level is maintained less than the limit.

D. SAFETY ANALYSIS

The previously proposed design feature Section 5.3.1.2.a limits fuel assembly storage in the new fuel racks to fuel assemblies enriched to 4.5 w/o consistent with the criticality analysis of record. A new analysis has been performed to justify increasing the new fuel rack enrichment limit to 5.00 w/o + 0.05 w/o to be consistent with the spent fuel storage limitations. UFSAR Section 3.3.1.5 states that the plant meets the ANSI Standard N18.2, "Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants," where the specified k_{eff} will not exceed 0.95 in spent fuel storage racks and transfer equipment flooded with pure water and will not exceed 0.98 in normally dry new fuel storage racks assuming optimum moderation.

UFSAR Section 9.12.1.1, Prevention of Fuel Storage Criticality, states that new fuel assemblies are stored dry in a steel and concrete structure within the fuel building. The new fuel assemblies are stored vertically, with a minimum center to center spacing of 21 inches. The spacing between the new fuel rack cells is covered with a steel plate at the top of the cells which maintains cell spacing and precludes placing fuel assemblies in other than the designated locations. This will maintain the fuel in a subcritical condition with $k_{eff} \leq 0.95$, for the full density (1 gm/cm^3) and $k_{eff} \leq 0.98$ for the low density (0.07 gm/cm^3) optimum moderation (aqueous foam) conditions.

The analysis methodology used to evaluate the potential for new fuel rack criticality is detailed in WCAP-14416, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology." This report describes the computer codes, benchmarking and methodology used to calculate the criticality safety limits for the new fuel storage racks. The new criticality analysis for the new fuel storage racks indicates the maximum k_{eff} including uncertainties at the 95/95 probability/confidence level is 0.9298 for full density and 0.9385 for optimum moderation conditions. Therefore, increasing the maximum fuel assembly enrichment to 5.00 w/o + 0.05 w/o complies with the ANSI Standard N18.2 limits. The maximum enrichment limit has been further modified by adding the words "with a tolerance of 0.05 weight percent" to ensure this limit is adequately defined in accounting for manufacturing

differences. Changes to applicable sections of the UFSAR will be incorporated in the next UFSAR update following issuance of the amendment to reflect the revised criteria provided in the new criticality analysis.

Increasing the new fuel enrichment limit does not change the release of effluents or change the radiation exposure to individuals. Site effluents are unaffected. There is no change to the release of effluents resulting from the new fuel enrichment limit; these are independent activities where one does not affect the other. The effect on dose to individuals from a fuel handling accident with the higher enriched fuel was evaluated in accordance with the spent fuel pool rerack (Amendment 178) effort and found that there was no significant change in the radiological consequences. The analyses results showed that the calculated doses were well within NUREG 0800 guidelines. This, therefore, results in no significant changes in the quality of the human environment. This request does not involve a significant change in the types or a significant increase in the amount of any effluents that may be released offsite and does not cause a significant increase in individual or cumulative occupational radiation exposure; the categorical exclusion criteria of 10 CFR 50.22(c)(9) is satisfied. Based on the new criticality analysis the proposed change has been determined to be safe and will not reduce the safety of the plant.

Schedule Requirements

Unit 1 is planning to load fuel with an enrichment greater than 4.5 w/o during the twelfth refueling outage, currently scheduled to begin on September 5, 1997. Receipt of the new fuel assemblies is scheduled to begin in June. Therefore, it is respectfully requested that the NRC Staff review and approve this license amendment request no later than June 27, 1997, so that the amendment is in place prior to placing new fuel with an enrichment greater than 4.5 w/o in the new fuel racks.

E. NO SIGNIFICANT HAZARDS EVALUATION

The no significant hazard considerations involved with the proposed amendment have been evaluated, focusing on the three standards set forth in 10 CFR 50.92(c) as quoted below:

> The Commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards consideration, if operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

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

The following evaluation is provided for the no significant hazards consideration standards.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The methodologies used in the accident analyses remain unchanged. The proposed changes do not change or alter the design assumptions for the systems or components used to mitigate the consequences of an accident.

   The operating limits will not be changed and the analysis methods to demonstrate operation within the limits will remain in accordance with NRC approved methodologies. Other than the changes to the fuel assemblies, there are no physical changes to the plant associated with this technical specification change.

   The maximum k_{eff} including uncertainties demonstrates substantial margin to criticality in the new fuel storage racks; therefore, the probability of a previously evaluated accident is not significantly increased. Since a criticality accident is demonstrated to not be credible with fuel enriched to 5.00 w/o + 0.05 w/o for both the full density and the optimum moderation conditions, the consequences of a previously evaluated accident are not significantly increased. In addition, the design of the new fuel racks assures that fuel assemblies cannot be placed in an unanalyzed configuration. Therefore, this change does not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

   The proposed changes do not affect the design or operation of any system or component in the plant. The safety functions of the related structures, systems, or components are not changed in any manner, nor is the reliability of any structure, system, or component reduced. The changes do not affect the manner by which the facility is operated and do not change any facility design feature, structure, or system. No new or different type of equipment will be installed. Since there is no change to the facility or operating

procedures, and the safety functions and reliability of structures, systems, or components are not affected, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

The increase in fuel enrichment could be considered a change in plant equipment; however, it would only affect reactivity. The reactivity increase has been analyzed and shown that no new or different kinds of accidents from any previously evaluated exist. The proposed change does not involve the addition of any plant equipment, nor does it modify the method of operation of any plant equipment. Also, the proposed change would not alter the design or configuration of the plant beyond the standard functional capabilities of the equipment. Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the change involve a significant reduction in a margin of safety?

Increasing the new fuel rack enrichment to 5.00 w/o will not involve a significant reduction in the margin of safety because analyses have been performed to demonstrate acceptable plant response. These analyses have been performed using the methodology detailed in WCAP-14416, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology," that describes the computer codes, benchmarking and methodology used to calculate the criticality safety limits.

The requirements of ANSI N18.2 limit the maximum K_{eff} to less than or equal to 0.98 for the optimum moderation condition. This is consistent with the regulatory limits provided in standard review plan Section 9.1.1. The current technical specification limit is very conservative with respect to the regulatory limit, so the Specification 5.3.1.2.c K_{eff} limit has been changed to be consistent with the regulatory limit. The criticality accident analysis results supporting this proposed change have been shown to meet the current technical specification limit. Therefore, changing the limit from less than or equal to 0.95 to less than or equal to 0.98 is not a significant change and results in consistency with regulatory guidance.

Increasing the new fuel enrichment limit does not change the release of effluents or change the radiation exposure to individuals. Site effluents are unaffected. There is no change to the release of effluents resulting from the new fuel enrichment limit; these are independent activities where one does not affect the other. The effect on dose to individuals from a fuel handling accident with the higher

enriched fuel was evaluated in accordance with the spent fuel pool rerack (Amendment 178) effort and found that there was no significant change in the radiological consequences. The analyses results showed that the calculated doses were well within NUREG 0800 guidelines. This, therefore, results in no significant changes in the quality of the human environment. This request does not involve a significant change in the types or a significant increase in the amount of any effluents that may be released offsite and does not cause a significant increase in individual or cumulative occupational radiation exposure. Based on the above, it is concluded that the proposed license amendment request does not result in a significant reduction in margin with respect to plant safety as defined in the UFSAR or any plant technical specification BASES.

The full density and optimum moderation conditions for the new fuel storage racks have been analyzed. The optimum moderation condition was determined to be limiting; however, it was found to satisfy the acceptance criteria by maintaining k_{eff} within the limits. This is consistent with the current design basis and ensures no adverse safety considerations are introduced. Increasing the new fuel rack enrichment limit to 5.00 w/o + 0.05 w/o is consistent with the spent fuel rack enrichment limit and has been shown to have no significant impact on the safety of the plant. Therefore, the proposed change will not involve a significant reduction in a margin of safety.

F. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Based on the considerations expressed above, it is concluded that the activities associated with this license amendment request satisfies the no significant hazards consideration standards of 10 CFR 50.92(c) and, accordingly, a no significant hazards consideration finding is justified.

G. UFSAR CHANGES

The UFSAR will be revised to reflect changes in the new fuel rack enrichment limit.

ATTACHMENT C

Beaver Valley Power Station, Unit No. 1
Proposed Technical Specification Change No. 241

[redacted]

Criticality Analysis of the Beaver Valley 1 Fresh Fuel Racks