ATTACHMENT I

PROPOSED TECHNICAL SPECIFICATION CHANGES REGARDING SAFETY LIMIT MINIMUM CRITICAL POWER RATIO

JPTS-89-036

New York Power Authority

JAMES A. FITZPATRICK NUCLEAR POWER PLANT
Docket No. 50-333

1.1 FUEL CLADDING INTEGRITY

Applicability:

The Safety Limits established to preserve the fuel cladding integrity apply to those variables which monitor the fuel thermal behavior.

Objective:

The objective of the Safety Limits is to establish limits below which the integrity of the fuel cladding is preserved.

Specifications:

A. Reactor Pressure >785 psig and Core Flow >10% of Rated

The existence of a minimum critical power ratio (MCPR) less than 1.07 shall constitute violation of the fuel cladding integrity safety limit, hereafter called the Safety Limit. An MCPR Limit of 1.08 shall apply during single-loop operation.

2.1 FUEL CLADDING INTEGRITY

Applicability:

The Limiting Safety System Settings apply to trip settings of the instruments and devices which are provided to prevent the fuel cladding integrity Safety Limits from being exceeded.

Objective:

The objective of the Limiting Safety System Settings is to define the level of the process variables at which automatic protective action is initiated to prevent the fuel cladding integrity Safety Limits from being exceeded.

Specifications:

A. Trip Settings

The limiting safety system trip settings shall be as specified below:

1. Neutron Flux Trip Settings

a. IRM - The IRM flux scram setting shall be set at ≤120/125 of full scale.

1.1 BASES

1.1 FUEL CLADDING INTEGRITY

The fuel cladding integrity limit is set such that no calculated fuel damage would occur as a result of an abnormal operational transient. Because fuel damage is not directly observable, a step-back approach is used to establish a Safety Limit such that the minimum critical power ratio (MCPR) is no less than 1.07. MCPR >1.07 represents a conservative margin relative to the conditions required to maintain fuel cladding integrity. The fuel cladding is one of the physical barriers which separate radioactive materials from the environs. The integrity of this cladding barrier is related to its relative freedom from perforations or cracking. Although some corrosion or use related cracking may occur during the life of the cladding, fission product migration from this source is incrementally cumulative and continuously measurable. Fuel cladding perforations, however, can result from thermal stresses which occur from reactor operation significantly above design conditions and the protection system safety settings. While fission product migration from cladding perforation is just as measurable as that from use related cracking, the thermally caused cladding perforations signal a threshold, beyond which still greater thermal stresses may cause gross rather than incremental cladding deterioration. Therefore, the fuel cladding Safety Limit is defined with margin to the conditions which would produce onset of transition boiling, (MCPR of 1.00). These conditions represent a significant departure from the condition intended by design for planned operation.

A. Reactor Pressure >785 psig and Core Flow >10% of Rated

Onset of transition boiling results in a decrease in heat transfer from the clad and, therefore, elevated clad temperature and the possibility of clad failure. However, the existence of critical power, or boiling transition, is not a directly observable parameter in an operating reactor. Therefore, the margin to boiling transition is calculated from plant operating parameters such as core power, core flow, feedwater temperature, and core power distribution. The margin for each fuel assembly is characterized by the critical power ratio (CPR) which is the ratio of the bundle power which would produce onset of transition boiling divided by the actual bundle power. The minimum value of this ratio for any bundle in the core is the minimum critical power ratio (MCPR). It is assumed that the plant operation is controlled to the nominal protective setpoints via the instrumented variable, i.e., the operating domain. The current load line limit analysis contains the current operating domain map. The Safety Limit (MCPR of 1.07) has sufficient conservatism to assure that in the event of an abnormal operational transient initiated from the MCPR operating conditions in specification 3.1.B, more than 99.9% of the fuel rods in the core are expected to avoid boiling transition. The MCPR fuel cladding safety limit is increased by 0.01 for single-loop operation as discussed in Reference 2. The margin between MCPR of 1.00 (onset of transition boiling) and the Safety Limit is derived from a detailed statistical analysis considering all of the uncertainties in monitoring the core operating state including the uncertainty in the boiling transition correlation as described in Reference 1. The uncertanties employed in deriving the Safety Limit are

ATTACHMENT II

SAFETY EVALUATION FOR PROPOSED TECHNICAL SPECIFICATION CHANGES REGARDING SAFETY LIMIT MINIMUM CRITICAL POWER RATIO

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JAMES A. FITZPATRICK NUCLEAR POWER PLANT
Docket No. 50-333

I. DESCRIPTION OF THE PROPOSED CHANGES

The proposed changes to the James A. FitzPatrick Technical Specifications revise Specification 1.1.A and the associated Bases on pages 7 and 12.

Page 7, Specification 1.1.A

Replace "1.04" with "1.07" and replace "1.05" with "1.08."

Page 12, Bases 1.1

In two places, replace "1.04" with "1.07"

Replace "1.0" with "1.00."

Page 12, Bases 1.1.A

Replace "1.04" with "1.07."

Replace "1.0" with "1.00."

II. PURPOSE OF THE PROPOSED CHANGES

The purpose of the proposed Technical Specification changes is to revise the safety limit Minimum Critical Power Ratio (MCPR) to the appropriate value to support the Reload 9/Cycle 10 core. Reload 9 will consist of General Electric GE-10 fuel assemblies designated GE8x8NB-3 in GE correspondence with the NRC and four GE-11 Lead Test Assemblies. The revised safety limit MCPR will be conservatively applied to all the fuel in the core. The MCPR value of 1.0 in the Bases is modified to 1.00 to show the same number of signficant figures as the safety limit MCPR.

These fuel assemblies have two unique features: an interactive channel design and an offset lower tie plate. The offset lower tie plate shifts the fuel bundle 40 mils towards the control blade, making the D-lattice core of the FitzPatrick plant more like the C-lattice cores of later BWR plants.

Although this reload core affects other cycle-specific parameter limits contained in the technical specifications, no other changes are required. The Authority is removing the remainder of the cycle-specific limits from the technical specifications in a separate amendment request. These other changes will be reflected in a Cycle 10 Core Operating Limits Report (COLR) in accordance with the guidance contained in Generic Letter 88-16. The COLR will be provided to the NRC prior to the startup of Cycle 10. Because the change requested in this application involves revision to a safety limit, it is inappropriate to remove it from the specifications, even though its value may change based upon the fuel design selected for the reload core (Reference 3).

III. IMPACT OF THE PROPOSED CHANGES

The unique features of the GE8x8NB-3 fuel design have been reviewed fully and approved by the NRC for use in BWRs. In the NRC acceptance of this fuel design (Reference 1), the NRC stated that the GE8x8NB C-lattice safety limit MCPR is acceptable for the GE8x8NB-3 fuel design. This safety limit of 1.07 is provided in Table 4-2, "Fuel Cladding Integrity Safety Limit MCPR" of General Electric's "Standard Application for Reactor Fuel" (Reference 2). This revised MCPR safety limit provides the same assurance as the previous safety limit value in preventing boiling transition. All aspects of this reload fuel design and its use at the FitzPatrick plant have been reviewed and approved by the NRC.

The application of this fuel design at the FitzPatrick plant allows greater operational flexibility and improved fuel performance. In addition, the enrichment and gadolinium loadings are designed to support the longer, 24 month cycle length planned for Cycle 11.

IV. EVALUATION OF SIGNIFICANT HAZARDS CONSIDERATION

Operation of the FitzPatrick plant in accordance with the proposed Amendment would not involve a significant hazards consideration as defined in 10 CFR 50.92, since it would not:

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

   NRC approved methodologies and codes have been used to perform all analyses concerning General Electric Co. fuel to be loaded at this refueling (Reference 1). The fuel design has been reviewed and approved for use at the FitzPatrick plant under the constraints and methodologies detailed in References 1 and 2. There are no unique aspects of this fuel or its application which have not undergone prior NRC review and approval. The refueling of the FitzPatrick reactor and Cycle 10 operation does not result in an increase in the probability or consequences of any accident previously evaluated.

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

   Refueling the FitzPatrick reactor is a periodic evolution performed in accordance with appropriate procedures and controlled by the Technical Specifications. The GE-10 fuel bundles inserted as Reload 9 have been fully reviewed by the NRC (Reference 1), and their use will not create the possibility of a new or different type of accident. The nuclear characteristics of the individual fuel bundles and the core loading pattern have been fully analyzed by the General Electric Co. and do not create the possibility of a new or different type of accident.

3. **involve a significant reduction in a margin of safety.**

   The analyses performed in support of this reload assure maintenance of all existing margins of safety. These analyses have resulted in core wide and bundle specific limits for General Electric Co. fuel which, when applied to the reloaded core, assure operation within the design criteria previously approved in References 1 and 2. The revised MCPR safety limit provides an equivalent margin of safety as the previous safety limit value in preventing boiling

transition. Therefore, the proposed change does not result in the reduction of any margin of safety.

V. IMPLEMENTATION OF THE PROPOSED CHANGE

Implementation of the proposed changes will not impact the ALARA or Fire Protection Programs at FitzPatrick, nor will the changes impact the environment.

VI. CONCLUSION

The change, as proposed, does not constitute an unreviewed safety question as defined in 10 CFR 50.59. That is, it:

a. will not change the probability nor the consequences of an accident or malfunction of equipment important to safety as previously evaluated in the Safety Analysis Report;

b. will not increase the possibility of an accident or malfunction of a type different from any previously evaluated in the Safety Analysis Report;

c. will not reduce the margin of safety as defined in the basis for any technical specification; and

d. involves no significant hazards consideration, as defined in 10 CFR 50.92.

VII. REFERENCES

1. NRC letter, A. C. Thadani to J. S. Charnley (GE), "Acceptance for Referencing of Amendment 21 to General Electric Licensing Topical Report NEDE-24011-P-A, 'General Electric Standard Application for Reactor Fuel,'" dated March 17, 1989.

2. "General Electric Standard Application for Reactor Fuel," Revision 9, dated September, 1988.

3. GE letter, J. S. Charnley to M. W. Hodges (NRC), "Acceptance Implementation of Generic Letter 88-16," dated August 8, 1989.

4. James A. FitzPatrick Nuclear Power Plant Updated Final Safety Analysis Report.

5. James A. FitzPatrick Nuclear Power Plant Safety Evaluation Report (SER), dated November 20, 1972, and Supplements.