November 4, 1996

Mr. William J. Cahill, Jr.
Chief Nuclear Officer
Power Authority of the State of New York
123 Main Street
White Plains, NY 10601

SUBJECT: ISSUANCE OF AMENDMENT FOR JAMES A. FITZPATRICK NUCLEAR POWER PLANT (TAC NO. M95522)

Dear Mr. Cahill:

The Commission has issued the enclosed Amendment No. 238 to Facility Operating License No. DPR-59 for the James A. FitzPatrick Nuclear Power Plant. The amendment consists of changes to the Technical Specifications (TSs) in response to your application transmitted by letter dated May 30, 1996, as supplemented October 17, 1996 and November 8, 1996.

The proposed amendment changes the FitzPatrick Safety Limit Minimum Critical Power Ratio from its current value of 1.07 for two recirculation loop operation to 1.09 and from 1.08 to 1.10 for single recirculation loop operation for the Cycle 13 operation.

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly Federal Register notice.

Sincerely,

/S/

K. R. Cotton, Acting Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosures: 1. Amendment No. 238 to DPR-59
2. Safety Evaluation

cc w/encls: See next page

DOCUMENT NAME: FIT95522.AMD

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 14, 1996

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Chief Nuclear Officer
Power Authority of the State of New York
123 Main Street
White Plains, NY 10601

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K. R. Cotton, Acting Project Manager
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2. Safety Evaluation

cc w/encls: See next page

William J. Cahill, Jr.
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James A. FitzPatrick Nuclear
Power Plant

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DATED: November 14, 1996

AMENDMENT NO. 238 TO FACILITY OPERATING LICENSE NO. DPR-59-FITZPATRICK

Docket File
PUBLIC
PDI-1 Reading
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G. Hill (2), T-5 C3
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

POWER AUTHORITY OF THE STATE OF NEW YORK

DOCKET NO. 50-333

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 238
License No. DPR-59

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Power Authority of the State of New York (the licensee) dated May 30, 1996, as supplemented October 17, 1996, and November 8, 1996, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-59 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 238 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance to be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Alexander W Dromerick for

S. Singh Bajwa, Acting Director
Project Directorate I-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: November 14, 1996

ATTACHMENT TO LICENSE AMENDMENT NO. 238

FACILITY OPERATING LICENSE NO. DPR-59

DOCKET NO. 50-333

Revise Appendix A as follows:

Remove Pages	Insert Pages
7	7
12	12
13	13
14	14

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 1.09 shall constitute violation of the fuel cladding integrity safety limit, hereafter called the Safety Limit. An MCPR Safety Limit of 1.10 shall apply during single-loop operation.

Note: TS 1.1.A is applicable for Cycle 13 only.

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 minimum critical power ratio (MCPR). This Safety Limit 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 1.0). 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 has sufficient conservatism to assure that in the event of an abnormal operational transient initiated from the MCPR operating limit in the Core Operating Limits Report, 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 1.0 (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. The method of determining the Safety Limit is described in Reference 1. The boiling transition correlation and the uncertainties employed in deriving the Safety Limit are

1.1 (cont'd)

provided in Reference 3. Because the boiling transition correlation is based on a large quantity of full scale data there is a very high confidence that operation of fuel assembly at the Safety Limit would not produce boiling transition. Thus, although it is not required to establish the safety limit, additional margin exists between the Safety Limit and the actual occurrence of loss of cladding integrity.

However, if boiling transition were to occur, clad perforation would not be expected. Cladding temperatures would increase to approximately 1100°F which is below the perforation temperature of the cladding material. This has been verified by tests in the General Electric Test Reactor (GETR) where fuel similar in design to FitzPatrick operated above the critical heat flux for a significant period of time (30 minutes) without clad perforation.

If reactor pressure should ever exceed 1400 psia during normal power operation (the limit of applicability of the boiling transition correlation) it would be assumed that the fuel cladding integrity Safety Limit has been violated.

In addition to the boiling transition limit (Safety Limit), operation is constrained by the maximum LHGR identified in the Core Operating Limits Report.

At 100% power, this limit is reached with a maximum fraction of limiting power density (MFLPD) equal to 1.00. In the event of operation with MFLPD greater than the fraction of rated power (FRP), the APRM scram and rod block settings shall be adjusted as specified in Tables 3.1-1 and 3.2-3 respectively.

B. <u>Core Thermal Power Limit (Reactor Pressure <785 psig)</u>

At pressures below 785 psig the core elevation pressure drop is greater than 4.56 psi for no boiling in the bypass region. At low powers and flows, this pressure drop is due to the elevation pressure of the bypass region of the core. Analysis shows that for bundle power in the range of 1-5 MWt, the channel flow will never go below 28×10^3 lb/hr. This flow results from the pressure differential between the bypass region and the fuel channel. The pressure differential is primarily a result of changes in the elevation pressure drop due to the density difference between the boiling water in the fuel channel and the non-boiling water in the bypass region. Full scale ATLAS test data taken at pressures from 0 to 785 psig indicate that the fuel assembly critical power at 28×10^3 lb/hr is approximately 3.35 MWt. With the design peaking factors, this corresponds to a core thermal power of more than 50%. Thus, a core thermal power limit of 25% for reactor pressures below 785 psig is conservative.

1.1 BASES (Cont'd)

C. Power Transient

Plant safety analyses have shown that the scrams caused by exceeding any safety system setting will assure that the Safety Limit of 1.1.A or 1.1.B will not be exceeded. Scram times are checked periodically to assure the insertion times are adequate. The thermal power transient resulting when a scram is accomplished other than by the expected scram signal (e.g., scram from neutron flux following closure of the main turbine stop valves) does not necessarily cause fuel damage. However, for this specification a Safety Limit violation will be assumed when a scram is only accomplished by means of a backup feature of the plant design. The concept of not approaching a Safety Limit provided scram signals are operable is supported by the extensive plant safety analysis.

D. Reactor Water Level (Hot or Cold Shutdown Condition)

During periods when the reactor is shut down, consideration must also be given to water level requirements due to the effect of decay heat. If reactor water level should drop below the top of the active fuel during this time, the ability to cool the core is reduced. This reduction in core cooling capability could lead to elevated cladding temperatures and clad perforation. The core will be cooled sufficiently to prevent clad melting should the water level be reduced to two-thirds the core height. Establishment of the Safety Limit at 18 in. above the top of the fuel provides adequate margin. This level will be continuously monitored whenever the recirculation pumps are not operating.

E. References

1. General Electric Standard Application for Reactor Fuel, NEDE-24011-P, latest approved revision and amendments.

2. FitzPatrick Nuclear Power Plant Single-Loop Operation, NEDO 24281, August 1980.

3. GE12 Compliance with Amendment 22 of NEDE-24011-P-A (GESTAR II), NEDE-32417P, December 1994.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 238 TO FACILITY OPERATING LICENSE NO. DPR-59

POWER AUTHORITY OF THE STATE OF NEW YORK

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated May 30, 1996, as supplemented by letters dated October 17 and November 8, 1996, Power Authority of the State of New York (PASNY or the licensee) proposed changes to the Technical Specifications (TSs) for the James A. FitzPatrick Nuclear Power Plant. The requested changes would revise the safety limit minimum critical power ratio (SLMCPR) from 1.07 to 1.09 for two recirculation loop operation and from 1.08 to 1.10 for single recirculation loop operation to support use of GE-12 fuel for FitzPatrick Cycle 13 operation. The October 17, and November 8, 1996, submittals contained supplemental information and does not alter the proposed no significant hazards consideration determination.

2.0 EVALUATION

The licensee requested a change to the James A. FitzPatrick Nuclear Power Plant Facility Operating License in accordance with 10 CFR 50.90. The revised TS was proposed as follows:

(1) Specification 1.1.A

Due to the use of GE12, the SLMCPR is proposed to change from 1.07 to 1.09 for two recirculation loop operation and from 1.08 to 1.10 for single loop operation based on the cycle-specific analysis performed by GE for FitzPatrick Cycle 13. FitzPatrick cycle-specific fuel and core parameters were used including the actual core loading, the most limiting permissible control blade patterns, the actual bundle parameters, and the full cycle exposure range.

The staff has reviewed the proposed TS changes which are based on the analyses performed using FitzPatrick cycle-specific inputs and approved methodologies including GESTAR II (NEDE-24011-P-A-11, Sections 1.1.5 and 1.2.5), and NEDO-10985-A, January 1977, for two loop operation and found them acceptable. Because the R-factor methodology referenced in NEDE-24011-P-A-11 is not applicable to the part length GE12 fuel, an improved R-factor methodology described in NEDC-32505P, "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," November 1995 was used. The improved R-factor calculation method uses the same NRC-approved equation

stated in GESTAR (NEDE-24011-P-A) with the correction factors to account for the peaking factor effects due to the part-length-rod design. The staff has reviewed the R-factor calculation method for GE12 and finds it acceptable for application to the GE12 fuel in FitzPatrick Cycle 13 operation. Use of the above methodologies will ensure that 99.9% for Cycle 13 of the rods in the core would not experience boiling transition.

(2) Bases 1.1 and E.3

The wording "as described in Reference 1" was replaced by a separate sentence "The method of determining the Safety Limit is described in Reference 1." The wording "The boiling transition correlation and" was added to the front of the sentence "the uncertainties employed in deriving the Safety Limit are provided in Reference" under Bases 1.1 and new GE12 Compliance with Amendment 22 of NEDE 24011-P-A (GESTAR II), NEDE-32417P, December 1994 (Reference 3) was added to References list under Bases E.3. These revisions are administrative in nature to clarify the meaning of the Bases, therefore, they are acceptable.

Based on our review, we conclude that the change to the SLMCPR TS is acceptable only for the James A. FitzPatrick Nuclear Power Plant Cycle 13 operation since the changes are analyzed based on the NRC approved method using FitzPatrick cycle-specific inputs. By letter dated November 8, 1996, a footnote was added to TS page 7, Section 1.1.A, stating the applicability of the MCPR values.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (61 FR 34896). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The NRC staff has reviewed the request by PASNY to revise the TS of the James A. FitzPatrick Nuclear Power Plant for the Cycle 13 operation. Based on the review, we conclude that the requested revision to SLMCPR is acceptable only for the Cycle 13 operation.

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: T. Huang

Date: November 14, 1996