



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

May 22, 1997

50-265

Ms. Irene Johnson, Acting Manager
Nuclear Regulatory Services
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 500
Downers Grove, IL 60515

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. M98349)

Dear Ms. Johnson:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 174 to Facility Operating License No. DPR-30 for the Quad Cities Nuclear Power Station, Unit 2. The amendment is in response to your application dated April 21, 1997.

The amendment increases the minimum critical power ratio (MCPR) safety limit for Unit 2 and adds a Siemens Power Corporation (SPC) reference to the Technical Specifications (TS) to allow plant operation in Operational Modes 1 and 2.

Your letter dated April 21, 1997, requested that this amendment be treated as an exigent TS change because insufficient time exists for the Commission's usual 30-day notice without preventing a normal ascension to power up to the plant's licensed power level for Unit 2. The staff concluded that the licensee has not abused the provisions for amendments involving exigent circumstances by failing to make timely application for the amendment for Unit 2. Although it is not entirely clear, the staff regards your letter request as involving TS changes for Unit 2 only. However, since Quad Cities, Units 1 and 2, have combined TSs, a request for changes in one unit only creates administrative difficulties. If we considered your request to be for Unit 1 as well, we would have to deny the request for Unit 1 changes, as the exigent circumstances attending the Unit 2 request are not present at Unit 1, which is operating and is not scheduled for a refueling outage until next year. We have resolved these difficulties by regarding your request as for Unit 2 changes only.

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I. Johnson

- 2 -

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

Sincerely,

Original signed by:

Robert M. Pulsifer, Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-265

Enclosures: 1. Amendment No. 174 to DPR-30
2. Safety Evaluation

cc w/encl: see next page

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DOCUMENT NAME: QC98349.AMD *See previous concurrence.

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DATE	05/22/97	05/22/97		05/22/97	05/21/97	05/22/97	

*with changes
all noted.*

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NAME	RPULSIFER <i>AP</i>	CMOORE <i>AP</i>	LPHILLIPS*	<i>APH</i>	RCAPRA <i>RO</i>
DATE	05/20/97	05/20/97	05/22/97	05/21/97	05/22/97

with changes as noted.

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Robert M. Pulsifer, Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-265

Enclosures: 1. Amendment No. 174 to DPR-30
2. Safety Evaluation

cc w/encl: see next page

I. Johnson
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Quad Cities Nuclear Power Station
Unit No. 2

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

COMMONWEALTH EDISON COMPANY

AND

MIDAMERICAN ENERGY COMPANY

DOCKET NO. 50-265

QUAD CITIES NUCLEAR POWER STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 174
License No. DPR-30

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Commonwealth Edison Company (the licensee) dated April 21, 1997, 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 3.B. of Facility Operating License No. DPR-30 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 174 , 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 and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert M. Pulsifer, Project Manager
Project Directorate III-2
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 22, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 174

FACILITY OPERATING LICENSE NO. DPR-30

DOCKET NO. 50-265

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE

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5-5a

6-16a

INSERT

2-1a

B 2-3a

5-5a

6-16a

2.0 SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

2.1 SAFETY LIMITS**THERMAL POWER, Low Pressure or Low Flow**

2.1.A THERMAL POWER shall not exceed 25% of RATED THERMAL POWER with the reactor vessel steam dome pressure less than 785 psig or core flow less than 10% of rated flow.

APPLICABILITY: OPERATIONAL MODE(s) 1 and 2.

ACTION:

With THERMAL POWER exceeding 25% of RATED THERMAL POWER and the reactor vessel steam dome pressure less than 785 psig or core flow less than 10% of rated flow, be in at least HOT SHUTDOWN within 2 hours and comply with the requirements of Specification 6.7.

THERMAL POWER, High Pressure and High Flow

2.1.B The MINIMUM CRITICAL POWER RATIO (MCPR) shall not be less than 1.07 for Unit 1 and 1.10* for Unit 2 with the reactor vessel steam dome pressure greater than or equal to 785 psig and core flow greater than or equal to 10% of rated flow. During single recirculation loop operation, this MCPR limit shall be increased by 0.01.

APPLICABILITY: OPERATIONAL MODE(s) 1 and 2.

ACTION:

With MCPR less than the above applicable limit and the reactor vessel steam dome pressure greater than or equal to 785 psig and core flow greater than or equal to 10% of rated flow, be in at least HOT SHUTDOWN within 2 hours and comply with the requirements of Specification 6.7.

* Applicable to Unit 2 for cycle 15 only.

BASES

approach. Much of the data indicates that BWR fuel can survive for an extended period in an environment of transition boiling.

The Unit 1 MCPR Safety Limit is 1.07, based on General Electric methods for calculating the MCPR Safety Limit. The Unit 2 MCPR Safety Limit is 1.10*, based on Siemens Power Corporation (SPC) methods for calculating the MCPR Safety Limit.

2.1.C Reactor Coolant System Pressure

The Safety Limit for the reactor coolant system pressure has been selected such that it is at a pressure below which it can be shown that the integrity of the system is not endangered. The reactor coolant system integrity is an important barrier in the prevention of uncontrolled release of fission products. It is essential that the integrity of this system be protected by establishing a pressure limit to be observed for all operating conditions and whenever there is irradiated fuel in the reactor vessel.

The reactor coolant system pressure Safety Limit of 1345 psig, as measured by the vessel steam space pressure indicator, is equivalent to 1375 psig at the lowest elevation of the reactor vessel. The 1375 psig value is derived from the design pressures of the reactor pressure vessel and coolant system piping. The respective design pressures are 1250 psig at 575°F and 1175 psig at 560°F. The pressure Safety Limit was chosen as the lower of the pressure transients permitted by the applicable design codes, ASME Boiler and Pressure Vessel Code Section III for the pressure vessel, and USASI B31.1 Code for the reactor coolant system piping. The ASME Boiler and Pressure Vessel Code permits pressure transients up to 10% over design pressure (110% x 1250 = 1375 psig), and the USASI Code permits pressure transients up to 20% over design pressure (120% x 1175 = 1410 psig). The Safety Limit pressure of 1375 psig is referenced to the lowest elevation of the reactor vessel. The design pressure for the recirculation suction line piping (1175 psig) was chosen relative to the reactor vessel design pressure. Demonstrating compliance of peak vessel pressure with the ASME overpressure protection limit (1375 psig) assures compliance of the suction piping with the USASI limit (1410 psig). Evaluation methodology to assure that this Safety Limit pressure is not exceeded for any reload is documented by the specific fuel vendor. The design basis for the reactor pressure vessel makes evident the substantial margin of protection against failure at the safety pressure limit of 1375 psig. The vessel has been designed for a general membrane stress no greater than 26,700 psi at an internal pressure of 1250 psig; this is a factor of 1.5 below the yield strength of 40,100 psi at 575°F. At the pressure limit of 1375 psig, the general membrane stress will only be 29,400 psi, still safely below the yield strength.

The relationships of stress levels to yield strength are comparable for the primary system piping and provides similar margin of protection at the established pressure Safety Limit.

The normal operating pressure of the reactor coolant system is nominally 1000 psig. Both pressure relief and safety relief valves have been installed to keep the reactor vessel peak pressure below 1375 psig. However no credit is taken for relief valves during the postulated full closure of all MSIVs without a direct (valve position switch) scram. Credit, however, is taken for the neutron flux scram. The indirect flux scram and safety valve actuation provide adequate margin below the allowable peak vessel pressure of 1375 psig.

* Applicable to Unit 2 cycle 15 only.

5.0 DESIGN FEATURES

5.3 REACTOR CORE**Fuel Assemblies**

- 5.3.A The reactor core shall contain 724 fuel assemblies. Each assembly consists of a matrix of Zircaloy clad fuel rods with an initial composition of natural or slightly enriched uranium dioxide as fuel material. The assemblies may contain water rods or water boxes. Limited substitutions of Zircaloy or ZIRLO filler rods for fuel rods, in accordance with NRC-approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff-approved codes and methods, and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in non-limiting core regions.

Control Rod Assemblies

- 5.3.B The reactor core shall contain 177 cruciform shaped control rod assemblies. The control material shall be boron carbide powder (B_4C) and/or hafnium metal. The control rod assembly shall have a nominal axial absorber length of 143 inches.

ADMINISTRATIVE CONTROLS

- (3) Commonwealth Edison Topical Report NFSR-0085, Supplement 1, "Benchmark of BWR Nuclear Design Methods - Quad Cities Gamma Scan Comparisons," (latest approved revision).
 - (4) Commonwealth Edison Topical Report NFSR-0085, Supplement 2, "Benchmark of BWR Nuclear Design Methods - Neutronic Licensing Analyses," (latest approved revision).
 - (5) Advanced Nuclear Fuels Methodology for Boiling Water Reactors, XN-NF-80-19(P)(A), Volume 1, Supplement 3, Supplement 3 Appendix F, and Supplement 4, Advanced Nuclear Fuels Corporation, November 1990.
 - (6) Commonwealth Edison Topical Report NFSR-0091, "Benchmark of CASMO/MICROBURN BWR Nuclear Design Methods", Revision 0, Supplements 1 and 2, December 1991, March 1992, and May 1992, respectively; SER letter dated March 22, 1993.
 - (7) Generic Mechanical Design Criteria for BWR Fuel Designs, ANF-89-98(P)(A) Revision 1, and Revision 1 Supplement 1, Advanced Nuclear Fuels Corporation, May 1995.
 - (8) Advanced Nuclear Fuels Corporation Generic Mechanical Design for Advanced Nuclear Fuels 9X9-IX and 9X9-9X BWR Reload Fuel, ANF-89-014(P)(A), Revision 1 and Supplements 1 and 2, Advanced Nuclear Fuels Corporation, October 1991.
 - (9)* ComEd letter, "ComEd Response to NRC Staff Request for Additional Information (RAI) Regarding the Application of Siemens Power Corporation ANFB Critical Power Correlation to Coresident General Electric Fuel for LaSalle Unit 2 Cycle 8 and Quad Cities Unit 2 Cycle 15, NRC Docket No.'s 50-373/374 and 50-254/265", J.B. Hosmer to U.S. NRC, July 2, 1996, transmitting the topical report, Application of the ANFB Critical Power Correlation to Coresident GE Fuel for Quad Cities Unit 2 Cycle 15, EMF-96-051(P), Siemens Power Corporation - Nuclear Division, May 1996, and related information.
- c. The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met. The CORE OPERATING LIMITS REPORT, including any mid-cycle revisions or supplements thereto, shall be provided upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

6.9.B Special Reports

Special reports shall be submitted to the Regional Administrator of the NRC Regional Office within the time period specified for each report.

* Applicable to Unit 2 for cycle 15 only.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 174 TO FACILITY OPERATING LICENSE NO. DPR-30
COMMONWEALTH EDISON COMPANY
AND
MIDAMERICAN ENERGY COMPANY
QUAD CITIES NUCLEAR POWER STATION, UNIT 2
DOCKET NO. 50-265

1.0 INTRODUCTION

By letter dated April 21, 1997, Commonwealth Edison Company (ComEd, the licensee) submitted a request for changes to the Technical Specifications (TS) for Quad Cities Nuclear Power Station, Unit 2, applicable only to that unit's Cycle 15. The requested changes reflect an increase in the minimum critical power ratio (MCPR) and add the Siemens Power Corporation (SPC) methodology for application of the Advanced Nuclear Fuel for Boiling Water Reactors (ANFB) Critical Power Correlation to coresident General Electric Company (GE) and SPC fuel for Quad Cities, Unit 2, Cycle 15. With this approval of the SPC methodology, the footnotes restricting the plant to Operational Modes 3, 4, and 5 have been deleted in accordance with ComEd's emergency TS application dated April 29, 1997, and Amendment No. 173 issued for Quad Cities, Unit 2, on May 2, 1997.

2.0 BACKGROUND

On June 10, 1996 (Reference 6), ComEd submitted to the staff for review and approval proposed TS changes to support the transition from GE fuel to SPC ATRIUM-9B fuel. The proposed TSs provided SPC terminology and applicable methodologies. On July 2, 1996 (Reference 8), ComEd submitted for review and approval, a topical report that describes the procedure for applying the SPC ANFB critical power correlation to the coresident GE fuel.

During an NRC audit in February 1997, the staff raised concerns with the uncertainty values used in the application of the ANFB critical power correlation to the ATRIUM-9B fuel design. To support Quad Cities, Unit 2, SPC submitted a topical report (Reference 3) to address specific concerns raised by the staff. ComEd also submitted this request for an exigent TS amendment (Reference 1) that revises the MCPR safety limit for Quad Cities, Unit 2, Cycle 15 (QC2C15).

On May 2, 1997, Amendment No. 173 was issued for Unit 2, which allowed operation of the plant not to exceed Operational Mode 3. This amendment modified Section 5.3.A, "Design Features" of the TSs to reflect the ATRIUM-9B fuel design and included various SPC topical reports in TS Section 6.9.A.6,

"Core Operating Limits Report," to reflect mechanical design criteria for this fuel and topical reports required for operation. That amendment allowed ATRIUM-9B fuel to be loaded into the core only under Operational Modes 3 (Hot Shutdown), 4 (Cold Shutdown), and 5 (Refueling) and did not permit startup or power operation using the ATRIUM-9B fuel.

The proposed changes include the Safety Limits Minimum Critical Power Ratio (SLMCPR) based on the cycle-specific analysis of the mixed core of SPC ATRIUM-9B and GE9/10 fuel parameters and the addition of SPC methodology for QC2C15 cycle-specific coresident fuel topical report to the Core Operating Limits Report (COLR) TS Section 6.9.A.6.b relating to the use of ATRIUM-9B fuel. Due to the limitations imposed in the approved ANFB Critical Power Correlation (ANF-1125(P)(A) and its Supplements 1 and 2) and the findings in the inspection of the Application of ANFB to ATRIUM-9B at SPC in February 1997, the licensee has proposed an interim use of increased ANFB Additive Constant Uncertainty (Reference 2) to support near-term QC2C15 startup while a generic topical report, ANF-1125(P) Supplement 1 Appendix D, "ANFB Critical Power Correlation Uncertainty for Limited Data Sets" (Reference 3), is under the staff's review.

3.0 EVALUATION

3.1 Application of ANFB Critical Power Correlation to Coresident GE Fuel for Quad Cities, Unit 2, Cycle 15

This plant specific topical report, EMF-96-051(P) (Reference 4), to support QC2C15 restart, was reviewed and approved by the staff in conjunction with the approved generic coresident topical report, EMF-1125(P), Supplement 1, Appendix C, "ANFB Critical Power Correlation Application for Co-Resident Fuel" (Reference 5).

3.2 Technical Specification Changes

The licensee requested a change to the TSs in accordance with 10 CFR 50.91(a)(6). The proposed revisions of the TSs and its associated Bases are only applicable to QC2C15 to reflect its use of SPC ATRIUM-9B fuel mixed with GE9/10 fuel. The proposed TS changes are described below.

(1) TS 2.1.B - Safety Limits and Bases 2.1.B - Safety Limits

The proposed changes for TS 2.1.B and Bases 2.1.B are to differentiate the safety limit MCPR number used for Quad Cities, Units 1 and 2, to reflect that only QC2C15 will have SPC ATRIUM-9B mixed with GE9/10 fuel, since the current TSs are the same for both units. The proposed change to TS 2.1.A is to add "for Unit 1 and 1.10 for Unit 2" to the context, which, as amended, reads, "The MCPR shall not be less than 1.07 for Unit 1 and 1.10 for Unit 2 with the reactor vessel steam dome pressure greater than or equal to 785 psig and core flow greater than or equal to 10% of rated flow." The following paragraph is proposed to add to Bases 2.1.B: "The Unit 1 MCPR Safety Limit is 1.07, based on General Electric methods for calculating the MCPR Safety Limit. The Unit 2

MCPR Safety Limit is 1.10, based on Siemens Power Corporation (SPC) methods for calculating the MCPR Safety Limit."

Based on the findings in the February 1997 audit at SPC, the value of 0.01 for the additive constant uncertainty (ACU) originally determined for the ATRIUM-9B fuel in Quad Cities, Unit 2, has been found to be based on an inadequate data base. A new estimate of the ACU for ATRIUM-9B fuel has been developed and submitted to NRC for review in a new topical, Appendix D of ANF-1125(P), Supplement 1 (Reference 3). This submittal is currently in the review process, but SPC is also seeking approval of an estimated value of the ACU for Quad Cities, Unit 2 (Reference 2), that can be used in the interim. The proposed interim estimate of the ACU is obtained as follows:

- a. first, determine the difference between the original ACU (0.01) and the estimated ACU (0.0195) obtained by the new methodology proposed in Appendix D (and currently under review). This results in a delta-ACU of 0.0095; and
- b. on the assumption that this delta-ACU represents a reasonable measure of the error in the original ACU (0.01), SPC proposes to obtain a conservative estimate of the error by multiplying the delta-ACU by two. A new estimate of the ACU is obtained by adding this conservative estimate of the error to the original ACU for the ATRIUM-9B fuel in Quad Cities, Unit 2; that is, the new conservative estimate of the ACU is 0.029.

The ACU estimate of 0.029 for Quad Cities, Unit 2, is an increase of 190 percent over the original ACU of 0.01, and an increase of approximately 49 percent over the estimated ACU determined in Appendix D for ATRIUM-9B fuel. In general, the ANFB correlation fits the available ATRIUM-9B data sets well enough to support the assumption that this interim estimate of the ACU (0.029) is conservative. Further, it is also reasonable to assume that this interim estimate will be found to be conservative even if the ACU value of 0.0195 determined in Appendix D must be modified as a result of findings of the review of the submittal. Therefore, the proposed safety limit for minimum critical power (SLMCPR) of 1.10 is acceptable based on the interim proposed ACU of 0.029 and the ACU for GE fuel stated in approved topical report (Reference 4) for QC2C15 operation. However, SPC and ComEd have committed to revise their SLMCPR calculations once Reference 3 is reviewed and a final value for the estimated ACU is approved.

(2) TS 6.9.A.6.b - Core Operating Limits Report

It is proposed to add to TS 6.9.A.6.b, an additional approved plant specific topical report, EMF-96-051(P), "Application of ANFB Critical Power Correlation to Coresident GE Fuel for Quad Cities Unit 2 Cycle 15," dated May 1996. The staff has found the proposed change acceptable since it is an NRC-approved topical report.

The addition of reference (9) in TS Section 6.9.A.6.b and the new MCPR safety limit is cycle specific for Unit 2, cycle 15. Therefore, TS pages 2-1a,

B 2-3a, and 6-16a were provided with a footnote to indicate "Applicable to Unit 2 for cycle 15 only."

(3) TS 5.0 - Design Features

By letter dated April 29, 1997, ComEd requested a change in TS Section 5.0. This request changed the words "zirconium alloys" to "Zircaloy or ZIRLO" in the sentence "Limited substitutions of Zircaloy or ZIRLO, in accordance with NRC-approved applications of fuel rod configurations, may be used." This change was approved in the safety evaluation (SE) related to the issuance of Amendment No. 173 for Unit 2, dated May 2, 1997.

Upon further review and discussions with ComEd on May 22, 1997, it was determined that to be consistent with Improved Standard Technical Specifications, NUREG-1433, Revision 1, and provide a clarification of what the substitutions will be for, additional words needed to be added. The licensee had inadvertently deleted the words "filler rods for fuel rods" in the amendment request. With approval from ComEd, the sentence was changed to read, "Limited substitutions of Zircaloy or ZIRLO filler rods for fuel rods, in accordance with NRC-approved applications of fuel rod configurations, may be used." The change provides clarification in meeting NRC-approved applications of fuel rod configurations and is consistent with NUREG-1433. Therefore, the proposed change is acceptable.

(4) TS 5.0 - Design Features and TS 6.9.A.6.b - Core Operating Limits Report

As stated in your letter dated April 29, 1997, and approved in the SE related to Amendment No. 173 for Unit 2, footnotes 1 and 2 on TS pages 5-5a and 6-16a will be eliminated upon approval of the use of ATRIUM-9B for all modes of operation. ATRIUM-9B fuel is approved for all Operational Modes with this increase of the MCPR safety limit; therefore, this change is acceptable.

Based on the above evaluation, the staff concludes that the changes to the TSs and the associated Bases are acceptable for QC2C15 application since the changes are analyzed based on a justified conservative ACU and the NRC-approved method.

4.0 EXIGENT CIRCUMSTANCES

Section 50.91 of the Commission's regulations contains provisions for issuance of amendments when the usual 30-day public notice period can not be met. One type of special exception is an exigency. An exigency is a case where the staff and licensee need to act quickly and time does not permit the Commission to publish a Federal Register notice allowing 30-days for prior public comment, and it also determines that the amendment involves no significant hazards considerations.

Under such circumstances, the Commission notifies the public in one of two ways: by issuing a Federal Register notice providing an opportunity for hearing and allowing at least two weeks for public comments, or by issuing a

press release discussing the proposed changes, using the local media. In this case, the Commission used the first approach.

In its April 21, 1997, application, the licensee requested that this amendment be treated as an exigent amendment. In accordance with 10 CFR 50.91(a)(6), the licensee provided the following information regarding why this exigent situation occurred and how it could not have been avoided.

The licensee states that the circumstances have resulted from issues raised during NRC vendor inspection activities at SPC in March 1997. The NRC staff could not support the uncertainty values used in the application of the ANFB critical power correlation to the ATRIUM-9B fuel design. On April 3, 1997, a meeting was held between the staff, SPC and ComEd to discuss the issue. Since that meeting, SPC has submitted a topical report (Reference 6) addressing this issue. The issue related to the uncertainty in the ANFB correlation for critical power monitoring of the SPC and GE fuel. Using this information, the licensee developed this amendment request for an increase in the MCPR safety limit. The review of the topical report (Reference 6) has caused an unanticipated delay in completing this approval process. Quad Cities, Unit 2, commenced fuel reload on May 7, 1997. The short time frame between discovery of the uncertainty issue at SPC on the ATRIUM-9B fuel, development of the new SPC topical report and this amendment, and the scheduled startup date did not allow for the normal 30-day period for public comment without resulting in a potential delay in the return to service of Unit 2.

The staff concludes that an exigent condition exists in that failure to act in a timely way would result in prevention of resumption of operation of Quad Cities Nuclear Power Station, Unit 2. In addition, the staff has assessed the licensee's reasons for failing to file an application sufficiently in advance to preclude an exigent condition, and concluded that the licensee has acted expeditiously to support the reviews of the SPC fuel uncertainty issue and upon learning of the delay in approval of the applications promptly proposed this amendment to remedy the situation. Thus, the staff concludes that the licensee has not abused the exigent provisions by failing to make timely application for the amendment. Thus, conditions needed to satisfy 10 CFR 50.91(a)(6) exist, and the amendment is being processed on an exigent basis.

5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92(c) state that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility in accordance with the 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 previously evaluated; or, (3) Involve a significant reduction in a margin of safety.

The following evaluation by the licensee demonstrates that the proposed amendment does not involve a significant hazards consideration:

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

The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. Limits have been established consistent with NRC approved methods to ensure that fuel performance during normal, transient, and accident conditions is acceptable. The proposed Technical Specifications amendment conservatively establishes the MCPR Safety Limit for Quad Cities Unit 2, such that the fuel is protected during normal operation and during any plant transients or anticipated operational occurrences. Additionally, methodologies are being added to the Section 6.9.A.6.b list of methodologies utilized in determining core operating limits.

- a. MCPR Safety Limit and MCPR Safety Limit Bases Change

The probability of an evaluated accident is not increased by increasing the MCPR Safety Limit to 1.10 and changing the MCPR Safety Limit Bases. The change does not require any physical plant modifications, physically affect any plant components, or entail changes in plant operation. Therefore, no individual precursors of an accident are affected.

This Technical Specification amendment proposes to change the MCPR Safety Limit to protect the fuel during normal operation as well as during any transients or anticipated operational occurrences. The method that is used to determine the ATRIUM-9B additive constant uncertainty is conservative, such that, the resulting MCPR Safety Limit is high enough to ensure that less than 0.1 percent of the fuel rods are expected to experience boiling transition if the limit is not violated. Operational limits will be established based on the proposed MCPR Safety Limit to ensure that the MCPR Safety Limit is not violated during all modes of operation. This will ensure that the fuel design safety criteria, more than 99.9 percent of the fuel rods avoiding transition boiling during normal operation as well as anticipated operational occurrences, is met. The method for calculating an ATRIUM-9B additive constant uncertainty, is described in Reference 2 [SPC document, ANFB Critical Power Correlation Uncertainty For Limited Data Sets, ANF-1125(P), Supplement 1, Appendix D, Siemens Power Corporation - Nuclear Division, submitted on April 18, 1971]

and is based on an expanded pool of data for the ATRIUM-9B fuel design (527 data points). The additive constant uncertainty from Reference 2 is then used to determine the change from the additive constant uncertainty using the original pool of data (125 data points). This difference is conservatively doubled and added to the additive constant uncertainty using the original pool of data (125 data points). Reference 5 [Siemens Power Corporation letter, "Interim Use of Increased ANFB Additive Constant Uncertainty," HDC:97:033, H.D. Curet to NRC Document Control Desk, dated April 18, 1971] documents the conservative interim approach of doubling the difference in additive constant uncertainties. The resulting additive constant uncertainty is used to determine the Quad Cities Unit 2 Cycle 15 MCPR Safety Limit. Since the new MCPR Safety Limit was determined using a conservative ATRIUM-9B additive constant uncertainty, and the operability of plant systems designed to mitigate any consequences of accidents have not changed, the consequences of an accident previously evaluated are not expected to increase.

- b. Addition of Siemens Power Corporation's (SPC) methodology for Application of the ANFB Critical Power Correlation to Coresident GE Fuel for Quad Cities Unit 2 Cycle 15 to Section 6.9.A.6.b

The probability of an evaluated accident is not increased by adding Reference 1 [ComEd letter, "ComEd Response to NRC Staff Request for Additional Information (RAI) Regarding the Application of Siemens Power Corporation ANFB Critical Power Correlation to Coresident General Electric Fuel for LaSalle Unit 2 Cycle 8 and Quad Cities Unit 2 Cycle 15, NRC Docket No.'s 50-373/374 and 50-254/265"; J.B. Hosmer to U.S. NRC, July 2, 1996, transmitting the topical report, Application of the ANFB Critical Power Correlation to Coresident GE Fuel for Quad Cities Unit 2 Cycle 15, EMF-96-051(P), Siemens Power Corporation - Nuclear Division, May 1996 and related information], to Section 6.9.A.6.b. Reference 1 describes the methodology used to determine the additive constants and the associated uncertainty of the Quad Cities Unit 2 Cycle 15 GE9 and GE10 fuel for the ANFB critical power correlation. The additive constant and the associated uncertainties for the GE9 and GE10 fuel are used to calculate the MCPR Safety Limit, which in turn is used to establish the MCPR operating limit for Quad Cities Unit 2 Cycle 15 operation. Therefore, adding Reference 1 to Section 6.9.A.6.b of the Technical Specifications updates the Reference list to include a methodology used for determining Quad Cities Unit 2 Cycle 15 operational limits.

Adding Reference 1 to the Reference list in Section 6.9.A.6.b also will not increase the consequences of an accident previously evaluated. Reference 1 determines the additive constants and the associated uncertainty for the GE fuel in Quad Cities Unit 2 Cycle 15. It also provides input for determining the MCPR Safety Limit. Because Reference 1 contains conservative methods and calculations and because the operability of plant systems designed to mitigate any consequences of accidents have not changed, the consequences of an accident previously evaluated will not increase.

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

Creation of the possibility of a new or different kind of accident would require the creation of one or more new precursors of that accident. New accident precursors may be created by modifications of the plant configuration, including changes in allowable modes of operation. This Technical Specification submittal does not involve any modifications of the plant configuration or allowable modes of operation. This Technical Specification submittal involves a) an added conservatism in the Quad Cities Unit 2 MCPR Safety Limit due to analytical changes and use of an expanded database, and b) an additional reference incorporated in Section 6.9.A.6.b describing the methodology used to determine the additive constants and additive constant uncertainty for GE9 and GE10 fuel for Quad Cities Unit 2 Cycle 15. Therefore, no new precursors of an accident are created and no new or different kinds of accidents are created.

3. Involve a significant reduction in the margin of safety for the following reasons:

The MCPR Safety Limit provides a margin of safety by ensuring that less than 0.1 percent of the rods are expected to be in boiling transition if the MCPR limit is not violated. The proposed Technical Specification amendment reflects MCPR Safety Limit results from conservative calculations by SPC using the new ATRIUM-9B additive constant uncertainty. These new ATRIUM-9B additive constant uncertainty calculations are based on a larger pool of data than previous calculations (527 data points versus 125 data points). Additionally, the additive constant uncertainty resulting from statistical analyses of the larger pool of data is conservatively applied to calculate a new MCPR Safety Limit of 1.10, which is more restrictive than the current MCPR Safety Limit of 1.07.

SPC has increased its ATRIUM-9B critical power test data base from 125 data points at 1000 psi with mass fluxes ranging from 0.5 to 1.5 Mlb/hr-ft², to 527 data points that cover a wider range of operating pressures, flows, and axial power shapes.

The Experimental Critical Power Ratio (ECPR) and the standard deviation of the ECPR for each of the 527 data points are statistically examined by an Analysis of Variance. The results of the Analysis of Variance of the Pressure Groups are a mean ECPR, a standard deviation of ECPR, degrees of freedom, and equivalent sample size.

The overall uncertainty for CPR is statistically calculated using the standard deviation of the pooled data and the variance between the means associated with the axial power shapes. An upper 95 percent confidence limit standard deviation is calculated based on Chi-Square for the calculated degrees of freedom. This overall standard deviation in ECPR is converted to an additive constant uncertainty. This conversion is derived from the ratios of the ANFB correlation standard deviation to the additive constant standard deviation for the ATRIUM-9B data.

This calculated additive constant uncertainty is not directly applied to the MCPR Safety Limit calculation. A conservative ATRIUM-9B additive constant uncertainty is used to calculate a new MCPR Safety Limit for Quad Cities Unit 2 Cycle 15.

The difference is calculated between the additive constant uncertainties after and prior to the data set being expanded to include 527 points. This difference is then conservatively doubled and added to the additive constant uncertainty prior to the expansion of the data set (based on 125 data points).

The resulting additive constant uncertainty, 0.029, is used to calculate a new MCPR Safety Limit value of 1.10 for Quad Cities Unit 2 Cycle 15.

Because a conservative method is used to apply the ATRIUM-9B additive constant uncertainty to the MCPR Safety Limit calculation, a decrease in the margin to safety will not occur due to changing the MCPR Safety Limit. The revised Safety Limit will ensure the appropriate level of fuel protection. Additionally, operational limits will be established based on the proposed MCPR Safety Limit to ensure that the MCPR Safety Limit is not violated during all modes of operation. This will ensure that the fuel design safety criteria, more than 99.9 percent of the fuel rods

avoiding transition boiling during normal operation as well as anticipated operational occurrences, is met.

The margin of safety is not decreased by adding the Reference to Section 6.9.A.6.b of Siemens Power Corporation's (SPC) methodology for application of the ANFB Critical Power Correlation to coresident GE Fuel for Quad Cities Unit 2 Cycle 15. While this methodology is in review by the NRC, and pending approval for application to Quad Cities Unit 2 Cycle 15, it is the same methodology previously reviewed and approved for use at LaSalle Unit 2 (References 3 and 4) [ComEd letter, "Application of Siemens Power Corporation ANFB Critical Power Correlation to Coresident General Electric Fuel for LaSalle Unit 2 Cycle 8;" G.G. Benes to U.S. Nuclear Regulatory Commission, dated March 8, 1996, and NRC SE, "Safety Evaluation for Topical Report EMF-96-021(P), Revision 1, 'Application of the ANFB Critical Power Correlation to Coresident GE Fuel for LaSalle Unit 2 Cycle 8' (TAC No. M94964)," D.M. Skay to I. Johnson, dated September 26, 1996.

Based upon the above considerations, the staff concludes the amendment involves no significant hazards consideration.

6.0 STATE CONSULTATION

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

7.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the 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 amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding (62 FR 23499). Accordingly, the amendments meet 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 amendments.

8.0 CONCLUSION

The staff has reviewed the request by ComEd to revise the TSs of the Quad Cities Nuclear Power Station, Unit 2, Cycle 15. Based on the review, the staff concludes that these revisions are acceptable.

The staff 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 to the public.

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Date: May 22, 1997

9.0 REFERENCES

1. Letter from E. S. Kraft, Jr. to USNRC (ESK-97-089), Quad Cities Nuclear Power Station Units 1 and 2 Exigent Application for Amendment Request to Facility Operating Licenses Pursuant to 10 CFR 50.91(a)(6), DPR-29 and DPR-30, Technical Specification Changes for Revised Minimum Critical Power Ratio Safety Limit for Quad Cities Unit 2 Cycle 15, dated April 21, 1997.
2. Letter from H. Donald Curet to USNRC (HDC:97:033), Interim Use of Increased ANFB Additive Constant Uncertainty, dated April 18, 1997.
3. ANF-1125(P), Supplement 1, Appendix D, ANFB Critical Power Correlation Uncertainty for Limited Data Sets, April 1997.
4. EMF-96-051(P), Application of ANFB Critical Power Correlation to Coresident GE Fuel for Quad Cities Unit 2 Cycle 15, May 1996.
5. ANFB-1125(P) Supplement 1 Appendix C, ANFB Critical Power Correlation Application for Co-Resident Fuel, November 1995.
6. Letter, ComEd to USNRC, "Application for Amendment Request to Facility Operating Licenses DPR-29 and DPR-30, Technical Specification Changes for Siemens Power Corporation (SPC) Fuel Transition," dated June 10, 1996.
7. Letter, ComEd to USNRC, "Supplement to Application for Amendment of Facility Operating License DPR-29 and DPR-30 Technical Specifications," dated February 17, 1997.
8. Letter, ComEd to USNRC, "ComEd Response to NRC Staff request for Additional Information (RAI) Regarding the Application of Siemen's Power Corporation ANFB Critical Power Correlation to Coresident General Electric Fuel for LaSalle Unit 2 Cycle 8 and Quad Cities Unit 2 Cycle 15," dated July 2, 1996.
9. Letter, ComEd to USNRC, "ComEd Response to Request for Additional Information on Topical Report EMF-96-051(P), Application of Siemens Power Corporation to Coresident GE Fuel for Quad Cities Unit 2 Cycle 15," dated February 17, 1997.