July 29, 2002

Mr. John L. Skolds, President Exelon Nuclear Exelon Generation Company, LLC 4300 Winfield Road Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: CHANGE IN MINIMUM CRITICAL POWER RATIO SAFETY LIMIT (TAC NO. MB4747)

Dear Mr. Skolds:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 207 to Facility Operating License No. DPR-29 for the Quad Cities Nuclear Power Station, Unit 1. The amendment consist of changes to the Technical Specifications in response to your application dated April 8, 2002, as supplemented June 18 and July 3, 2002.

The amendment revises the safety limit minimum critical power ratio for two-loop and single-loop operation.

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,

/**RA**/

Carl F. Lyon, Project Manager, Section 2 Project Directorate III Division of Licensing Project Management Office of Nuclear Reactor Regulation

Docket No. 50-254

Enclosures: 1. Amendment No. 207 to DPR-29 2. Safety Evaluation

cc w/encls: See next page

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\*SE dated 7/10/02

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Quad Cities Nuclear Power Station Units 1 and 2

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- 2 -

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## EXELON GENERATION COMPANY, LLC

## <u>AND</u>

## MIDAMERICAN ENERGY COMPANY

## DOCKET NO. 50-254

## QUAD CITIES NUCLEAR POWER STATION, UNIT 1

#### AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 207 License No. DPR-29

- 1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Exelon Generation Company, LLC (the licensee) dated April 8, 2002, as supplemented June 18 and July 3, 2002, 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-29 is hereby amended to read as follows:

## B. <u>Technical Specifications</u>

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 207, 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 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Anthony J. Mendiola, Chief, Section 2 Project Directorate III Division of Licensing Project Management Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: July 29, 2002

# ATTACHMENT TO LICENSE AMENDMENT NO. 207

#### FACILITY OPERATING LICENSE NO. DPR-29

## DOCKET NO. 50-254

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by number and contain marginal lines indicating the area of change.

Remove Pages

Insert Pages

2.0-1

2.0-1

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# RELATED TO AMENDMENT NO. 207 TO FACILITY OPERATING LICENSE NO. DPR-29

## EXELON GENERATION COMPANY, LLC

## <u>AND</u>

# MIDAMERICAN ENERGY COMPANY

# QUAD CITIES NUCLEAR POWER STATION, UNIT 1

## DOCKET NOS. 50-254

## 1.0 INTRODUCTION

By application dated April 8, 2002 (Reference 1), as supplemented by letters dated June 18 and July 3, 2002 (References 2 and 3, respectively), Exelon Generation Company, LLC (the licensee) requested changes to the Technical Specifications (TSs) for the Quad Cities Nuclear Power Station, Unit 1. The supplements dated June 18 and July 3, 2002, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on May 14, 2002 (67 FR 34487).

The proposed changes would revise the safety limit (SL) minimum critical power ratio (MCPR) for two-loop (TLO) and single-loop operation (SLO) with exposure greater than 4,000 megawatt days per metric ton uranium (MWD/MT). The change is necessary due to new safety analyses performed to support operation following a mid-cycle core fuel assembly shuffle by the licensee in January 2002. Specifically, the proposed changes would revise:

## 1.1 <u>TS 2.1.1.2</u>

The licensee proposes to revise the value of the SLMCPR in TS 2.1.1.2 to read, "With the reactor steam dome pressure  $\geq$  785 psig and core flow  $\geq$  10% rated core flow:

For Unit 1, with Cycle 17A exposure less than or equal to 4,000 MWD/MT, for two recirculation loop operation, MCPR shall be  $\geq$  1.11, or for single recirculation loop operation, MCPR shall be  $\geq$  1.12. For Unit 1, with Cycle 17A exposure greater than 4,000 MWD/MT, for two recirculation loop operation MCPR shall be  $\geq$  1.15, or for single recirculation loop operation MCPR shall be  $\geq$  1.16.

For Unit 2, MCPR shall be  $\ge$  1.11 for two recirculation loop operation, or for single recirculation loop operation, MCPR shall be  $\ge$  1.12."

#### 2.0 REGULATORY EVALUATION

The design bases for the fuel are described in Updated Final Safety Analysis Report (UFSAR) section 4.2.1.1. The critical power ratio limit was established to meet, in part, the requirements of 10 CFR 50.46 by avoiding fuel damage due to severe overheating of the fuel cladding. The fuel cladding integrity SLMCPR was established to assure that at least 99.9 percent of the fuel rods in the core do not experience boiling transition during normal operation and anticipated operational occurrences. The requirement is derived, in part, from General Design Criteria (GDC) 10 of Appendix A to 10 CFR Part 50 regarding acceptable fuel design limits.

The staff concludes that the proposed TS changes will maintain compliance with the regulatory requirements of GDC 10.

#### 3.0 TECHNICAL EVALUATION

Unit 1 was shutdown on January 9, 2002, during Cycle 17 to investigate indications of a jet pump failure and was restarted on February 5, 2002, following replacement of jet pump hold down beams. During this shutdown period, the licensee replaced a leaking Siemens ATRIUM-9B fuel assembly (3.82 weight percent bundle enrichment and 12 gadolinium rods) with a General Electric (GE)-10 fuel assembly (3.12 weight percent bundle enrichment and 7 gadolinium rods) and shuffled fuel assemblies in the reactor core, in order to obtain additional thermal energy from the reactor core and reduce a planned power coastdown at the end of Cycle 17. Due to the mid-cycle core shuffle, the licensee performed a new safety analysis to justify operation within the current TS operating limits. The analysis results for the re-shuffled core (designated Cycle 17A) continued to support the current TLO SLMCPR of 1.11 and SLO SLMCPR of 1.12 up to a Cycle 17A exposure of 4,140 MWD/MT. However, for operation beyond 4,140 MWD/MT, the required TLO SLMCPR is 1.15 and the required SLO SLMCPR is 1.16 to ensure that fewer than 0.1 percent of the rods are predicted to experience boiling transition. The licensee proposes to revise the SLMCPR for Cycle 17A exposure greater than 4,000 MWD/MT. The exposure of 4,000 MWD/MT was proposed by the licensee as a more conservative number than the 4,140 MWD/MT used in the safety analysis.

The licensee provided additional information to justify the increase of the SLMCPR values. The licensee stated (References 2 and 3) that the increase in the SLMCPR for Cycle 17A beyond 4,140 MWD/MT is primarily due to the location of the GE-10 fuel in the Cycle 17A core design and the subsequent impact on the SLMCPR of channel bow through local power peaking and f-effective (term used to account for the effects within a bundle due to groupings of high power rods) changes in neighboring bundles. For Cycle 17A, the highest exposed fuel are GE-10 bundles. The GE-10 bundles with channel exposures greater than 40 gigawatt days per metric ton uranium (GWD/MT) will impact the ATRIUM-9B peaking more than GE-10 bundles with channel exposures below 40 GWD/MT, based on the channel bow mean and standard deviation bounding values (Reference 3). The results (Reference 3) also indicate that about three times the number of fresh ATRIUM-9B bundles likely to contribute rods in boiling transition for Cycle 17A than the number for Cycle 17 are face-adjacent to GE-10 bundles with exposures greater than 40 GWD/MT. Consequently, the bundles most likely to contribute rods in boiling transition to the SLMCPR analysis are the fresh ATRIUM-9B bundles face-adjacent to GE-10 bundles with channel exposures greater than 40 GWD/MT. As a result, the Cycle 17A

SLMCPR increases by 0.04 due to the change in mean channel bow and channel bow uncertainties.

Based on the results of the review, the staff finds that the SLMCPR analysis for Cycle 17A operation using the plant- and cycle-specific parameters, in conjunction with the NRC-approved methodology, is acceptable. The proposed Cycle 17A SLMCPR values will ensure that 99.9 percent of the fuel rods in the core will not experience boiling transition, which satisfies the requirements of GDC 10 regarding acceptable fuel design limits. The staff concluded that the licensee's justification for analyzing and determining the SLMCPR value of 1.15 for two recirculation loop operation and 1.16 for single recirculation loop operation, for exposures greater than 4,000 MWD/MT, is acceptable for Cycle 17A, because the licensee used NRC-approved methodology in its calculations. The details of the licensee's calculations are subject to future staff audit.

## 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendment. The State official had comments.

## 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 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 (67 FR 34487). 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.

## 6.0 <u>CONCLUSION</u>

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

# 7.0 <u>REFERENCES</u>

- 1. Letter (RS-02-073) from Keith R. Jury to USNRC, "Request for Technical Specifications Change for Minimum Critical Power Ratio Safety Limit," April 8, 2002.
- 2. Letter (RS-02-114) from P. R. Simpson to USNRC, "Supplemental Information Supporting the Request for Technical Specification Changes for Minimum Critical Power Ratio Safety Limit," June 18, 2002.
- 3. Letter (RS-02-126) from Keith R. Jury to USNRC, "Supplemental Information Supporting the Request for Technical Specification Changes for Minimum Critical Power Ratio Safety Limit," July 3, 2002 (Non-proprietary version available).

Principal Contributor: T. Huang

Date: July 29, 2002