

Mr. Garrett D. Edwards  
Director-Licensing, MC 62  
PECO Energy Company  
Nuclear Group Headquarters  
Correspondence Control Desk  
P.O. Box No. 195  
Wayne, PA 19087-0195

May 14, 1999

SUBJECT: LIMERICK GENERATING STATION, UNIT 2 - ISSUANCE OF AMENDMENT RE:  
REVISION TO MINIMUM CRITICAL POWER RATIO (MCPR) SAFETY LIMITS  
(TAC NO. MA4957)

Dear Mr. Edwards:

The Commission has issued the enclosed Amendment No. 97 to Facility Operating License No. NPF-85 for the Limerick Generating Station, Unit 2. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated March 11, 1999, as supplemented April 21, 1999.

This amendment revises the MCPR safety limits and the associated TS Bases.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by:

Bartholomew C. Buckley, Sr. Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-353

Enclosures: 1. Amendment No. 97 to  
License No. NPF-85  
2. Safety Evaluation

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Mr. Garrett D. Edwards  
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 P.O. Box No. 195  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

May 14, 1999

Mr. Garrett D. Edwards  
Director-Licensing, MC 62A-1  
PECO Energy Company  
Nuclear Group Headquarters  
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A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

A handwritten signature in cursive script that reads "Bartholomew C. Buckley, Sr.".

Bartholomew C. Buckley, Sr. Project Manager, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-353

Enclosures: 1. Amendment No. 97 to  
License No. NPF-85  
2. Safety Evaluation

cc w/encls: See next page

Limerick Generating Station, Units 1 & 2

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

PECO ENERGY COMPANY

DOCKET NO. 50-353

LIMERICK GENERATING STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 97  
License No. NPF-85

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by PECO Energy Company (the licensee) dated March 11, 1999, as supplemented April 21, 1999, 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.

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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. NPF-85 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 97 , are hereby incorporated into this license. PECO Energy Company shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented prior to restart following completion of the April 1999 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION



James W. Clifford, Chief, Section 2  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: May 14, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 97

FACILITY OPERATING LICENSE NO. NPF-85

DOCKET NO. 50-353

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

Remove  
2-1  
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Insert  
2-1  
B 2-1

## 2.0 SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

### 2.1 SAFETY LIMITS

#### THERMAL POWER, Low Pressure or Low Flow

2.1.1 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 CONDITIONS 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 6.7.1.

#### THERMAL POWER, High Pressure and High Flow

2.1.2 The MINIMUM CRITICAL POWER RATIO (MCPR) shall not be less than 1.12 for two recirculation loop operation and shall not be less than 1.14 for single recirculation loop operation with the reactor vessel steam dome pressure greater than 785 psig and core flow greater than 10% of rated flow.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2.

#### ACTION:

With MCPR less than 1.12 for two recirculation loop operation or less than 1.14 for single recirculation loop operation and the reactor vessel steam dome pressure greater than 785 psig and core flow greater than 10% of rated flow, be in at least HOT SHUTDOWN within 2 hours and comply with the requirements of Specification 6.7.1.

#### REACTOR COOLANT SYSTEM PRESSURE

2.1.3 The reactor coolant system pressure, as measured in the reactor vessel steam dome, shall not exceed 1325 psig.

APPLICABILITY: OPERATION CONDITIONS 1, 2, 3, and 4.

#### ACTION:

With the reactor coolant system pressure, as measured in the reactor vessel steam dome, above 1325 psig, be in at least HOT SHUTDOWN with reactor coolant system pressure less than or equal to 1325 psig within 2 hours and comply with the requirements of Specification 6.7.1.



## 2.1 SAFETY LIMITS

### BASES

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## 2.0 INTRODUCTION

The fuel cladding, reactor pressure vessel and primary system piping are the principle barriers to the release of radioactive materials to the environs. Safety Limits are established to protect the integrity of these barriers during normal plant operations and anticipated transients. The fuel cladding integrity Safety Limit is set such that no fuel damage is calculated to occur if the limit is not violated. Because fuel damage is not directly observable, a step-back approach is used to establish a Safety Limit such that the MCPR is not less than 1.12 for two recirculation loop operation and 1.14 for single recirculation loop operation. MCPR greater than 1.12 for two recirculation loop operation and 1.14 for single recirculation loop operation 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 the 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 Limiting Safety System 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 a 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. The MCPR values for both dual-loop and single loop operation, listed above, are valid only for Cycle 6 operation.

### 2.1.1 THERMAL POWER, Low Pressure or Low Flow

The use of the (GEXL) correlation is not valid for all critical power calculations at pressures below 785 psig or core flows less than 10% of rated flow. Therefore, the fuel cladding integrity Safety Limit is established by other means. This is done by establishing a limiting condition on core THERMAL POWER with the following basis. Since the pressure drop in the bypass region is essentially all elevation head, the core pressure drop at low power and flows will always be greater than 4.5 psi. Analyses show that with a bundle flow of  $28 \times 10^3$  lb/hr, bundle pressure drop is nearly independent of bundle power and has a value of 3.5 psi. Thus, the bundle flow with a 4.5 psi driving head will be greater than  $28 \times 10^3$  lb/hr. Full scale ATLAS test data taken at pressures from 14.7 psia to 800 psia indicate that the fuel assembly critical power at this flow is approximately 3.35 Mwt. With the design peaking factors, this corresponds to a THERMAL POWER of more than 50% of RATED THERMAL POWER. Thus, a THERMAL POWER limit of 25% of RATED THERMAL POWER for reactor pressure below 785 psig is conservative.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED AMENDMENT NO. 97 TO FACILITY OPERATING LICENSE NO. NPF-85

PECO ENERGY COMPANY  
LIMERICK GENERATING STATION, UNIT 2

DOCKET NO. 50-353

1.0 INTRODUCTION

By letter dated March 11, 1999 (Ref. 1), as supplemented by letter dated April 21, 1999 (Ref. 3), PECO Energy Company (the licensee), submitted a request to amend the Technical Specifications (TS) for the Limerick Generating Station, Unit 2 (Limerick Unit 2). The proposed TS amendment reflects changes to the Minimum Critical Power Ratio (MCPR) Safety Limit due to the use of cycle-specific analyses performed by General Electric Nuclear Energy (GENE) for Limerick Unit 2 Cycle 6. The Limerick Unit 2 Cycle 6 core is a mixed core with GE11, GE13, and Ex-Shoreham GE6 (reused channels) fuel bundles. The April 21, 1999, letter provided clarifying information that did not change the initial no significant hazards consideration determination.

2.0 DISCUSSION

The licensee has requested TS changes for the Limerick Unit 2 Cycle 6 reload. The proposed changes involve TS 2.1, "Safety Limits," and the associated TS Bases. Safety limits are established to protect the integrity of the fuel cladding, reactor pressure vessel, and primary system piping during normal plant operations and anticipated transients. The fuel cladding integrity Safety Limit is the MCPR. The purpose of the MCPR Safety Limit is to ensure that greater than 99.9 percent of all fuel rods in the core avoid transition boiling if the limit is not violated.

The Limerick Unit 2 Cycle 6 MCPR Safety Limits were calculated using GESTAR-II Rev. 13, described in NEDE-24011-P-A-13 and Amendment 25 to NEDE-20411-P-A. Amendment 25 to GESTAR-II provides the methodology for implementation of cycle-specific MCPR Safety Limits that replace the former generic bounding MCPR Safety Limits. By letter dated March 11, 1999 (Ref. 2), the Nuclear Regulatory Commission (NRC) approved Amendment 25 to NEDE-20411-P-A for referencing in license applications. The staff's March 11, 1999, evaluation concludes that the methodology described in Amendment 25 is acceptable for determining cycle-specific values for MCPR Safety Limits.

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The new MCPR Safety Limits for Limerick Unit 2 Cycle 6 were calculated based on cycle-specific inputs which include the following parameters: the actual core design; projected control blade patterns; the actual bundle parameters; and the full cycle exposure range. The MCPR Safety Limits for Cycle 6 were determined to be 1.12 for operation with two recirculation loops and 1.14 for single loop operation.

The Limerick Unit 2 Cycle 6 analysis using cycle-specific inputs in conjunction with the approved method is acceptable. The Cycle 6 MCPR Safety Limit will ensure that 99.9 percent of the fuel rods in the core will not experience boiling transition which satisfies the requirements of General Design Criterion 10 of Appendix A to 10 CFR Part 50 regarding acceptable fuel design limits.

Therefore, the staff has concluded that the justification for determining the MCPR Safety Limit value of 1.12 for two loop operation and 1.14 for single loop operation using approved methodologies is acceptable.

### 3.0 TECHNICAL SPECIFICATION CHANGES

The licensee has proposed to change TS 2.1.2, "Safety Limits - Thermal Power, High Pressure and Low Flow," and the supporting Bases section to reflect the new MCPR Safety Limits. The MCPR Safety Limit is changed from 1.11 to 1.12 for two recirculation loop operation and from 1.12 to 1.14 for single recirculation loop operation with the reactor vessel steam dome pressure greater than 785 psig and core flow greater than 10% of rated flow. The Bases section has also been revised to indicate that the above listed MCPR Safety Limits values are valid only for Cycle 6 operation. These changes are based on the results of cycle-specific analyses performed using NRC-approved methodologies. These changes are acceptable.

### 4.0 SUMMARY CONCLUSIONS

The staff has reviewed the licensee's proposed TS changes relating to the MCPR. Based on the review, the staff concludes that the proposed TS changes are acceptable.

### 5.0 STATE CONSULTATION

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

### 6.0 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 (64 FR 17028). 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.

## 7.0 CONCLUSION

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: A. Cabbage

Date: May 14, 1999

## 8.0 REFERENCES

1. Letter from Garrett D. Edwards, PECO Energy Company, to U.S. NRC, "Limerick Generating Station Unit 2, Technical Specification Change Request No. 98-07-2," dated March 11, 1999.
2. Letter from Frank Akstulewicz, NRC, to Glen A. Watford, "Acceptance for Referencing of Licensing Topical Reports NEDC-32601P, Methodology and Uncertainties for Safety Limit MCPR Evaluations; NEDC-32694P, Power Distribution Uncertainties for Safety Limit MCPR Evaluation; and Amendment 25 to NEDE-24011-P-A on Cycle-Specific Safety Limit MCPR," dated March 11, 1999.
3. Letter from Garrett D. Edwards, PECO Energy Company, to U.S. NRC, "Limerick Generating Station Unit 2, Technical Specification Change Request No. 98-07-2," dated April 21, 1999.