

July , 1995

Mr. D. L. Farrar  
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. M91160)

Dear Mr. Farrar:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 64 to Facility Operating License No. NPF-72, and Amendment No. 64 to Facility Operation License No. NPF-77 for the Braidwood Station, Unit Nos. 1 and 2, respectively. The amendments are in response to your application dated June 8, 1995, which superseded your December 16, 1994, request in its entirety. Additional correspondence dated November 30, 1994, April 27, May 5, May 11 and June 23, 1995, related to the amendment request were also received.

The amendments revise Figure 3.4-4a "Nominal PORV Pressure Relief Setpoint Versus RCS Temperature for the Cold Overpressure Protection (LTOP) System" in the Braidwood Unit 1's Technical Specifications (TS). The revision extends the applicability of Figure 3.4-4a from 5.37 effective full power years (EFPY) to 16 EFPY. In addition, the amendments remove the 638 psig administrative limit line from the LTOP curve, because the appropriate instrument uncertainties and discharge piping pressure limits have been incorporated in the new curve. Finally, the amendments contains administrative changes to Figure 3.4-4a and its associated index page.

Although the specific changes apply to Braidwood, Unit 1, the license for Braidwood, Unit 2, is also being amended because both units have common TSs. A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,  
Original signed by:

Ramin R. Assa, Project Manager  
Project Directorate III-2  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-456 and STN 50-457

- Enclosures: 1. Amendment No. 64 to NPF-72
- 2. Amendment No. 64 to NPF-77
- 3. Safety Evaluation

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

July 24, 1995

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Sincerely,

A handwritten signature in black ink, appearing to read "Ramin R. Assa".

Ramin R. Assa, Project Manager  
Project Directorate III-2  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-456 and STN 50-457

Enclosures: 1. Amendment No. 64 to NPF-72  
2. Amendment No. 64 to NPF-77  
3. Safety Evaluation

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D. L. Farrar  
Commonwealth Edison Company

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Unit Nos. 1 and 2

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

COMMONWEALTH EDISON COMPANY

DOCKET NO. STN 50-456

BRAIDWOOD STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 64  
License No. NPF-72

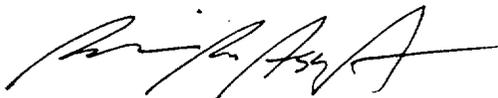
1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated June 8, 1995, which superseded the December 16, 1994, request in its entirety, and additional correspondence dated November 30, 1994, April 27, May 5, May 11 and June 23, 1995, related to the amendment request, 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. NPF-72 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 64 and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Ramin R. Assa, 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: July 24, 1995



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

COMMONWEALTH EDISON COMPANY

DOCKET NO. STN 50-457

BRAIDWOOD STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 64  
License No. NPF-77

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Commonwealth Edison Company (the licensee) dated June 8, 1995, which superseded the December 16, 1994, request in its entirety, and additional correspondence dated November 30, 1994, April 27, May 5, May 11 and June 23, 1995, related to the amendment request, 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. NPF-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A as revised through Amendment No. 64 and the Environmental Protection Plan contained in Appendix B, both of which were attached to License No. NPF-72, dated July 2, 1987, are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Ramin R. Assa, 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: July 24, 1995

ATTACHMENT TO LICENSE AMENDMENT NOS. 64 AND 64

FACILITY OPERATING LICENSE NOS. NPF-72 AND NPF-77

DOCKET NOS. STN 50-456 AND STN 50-457

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. Pages marked with an asterisk are provided for convenience.

Remove Pages

Insert Pages

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VIII

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3/4 4-40

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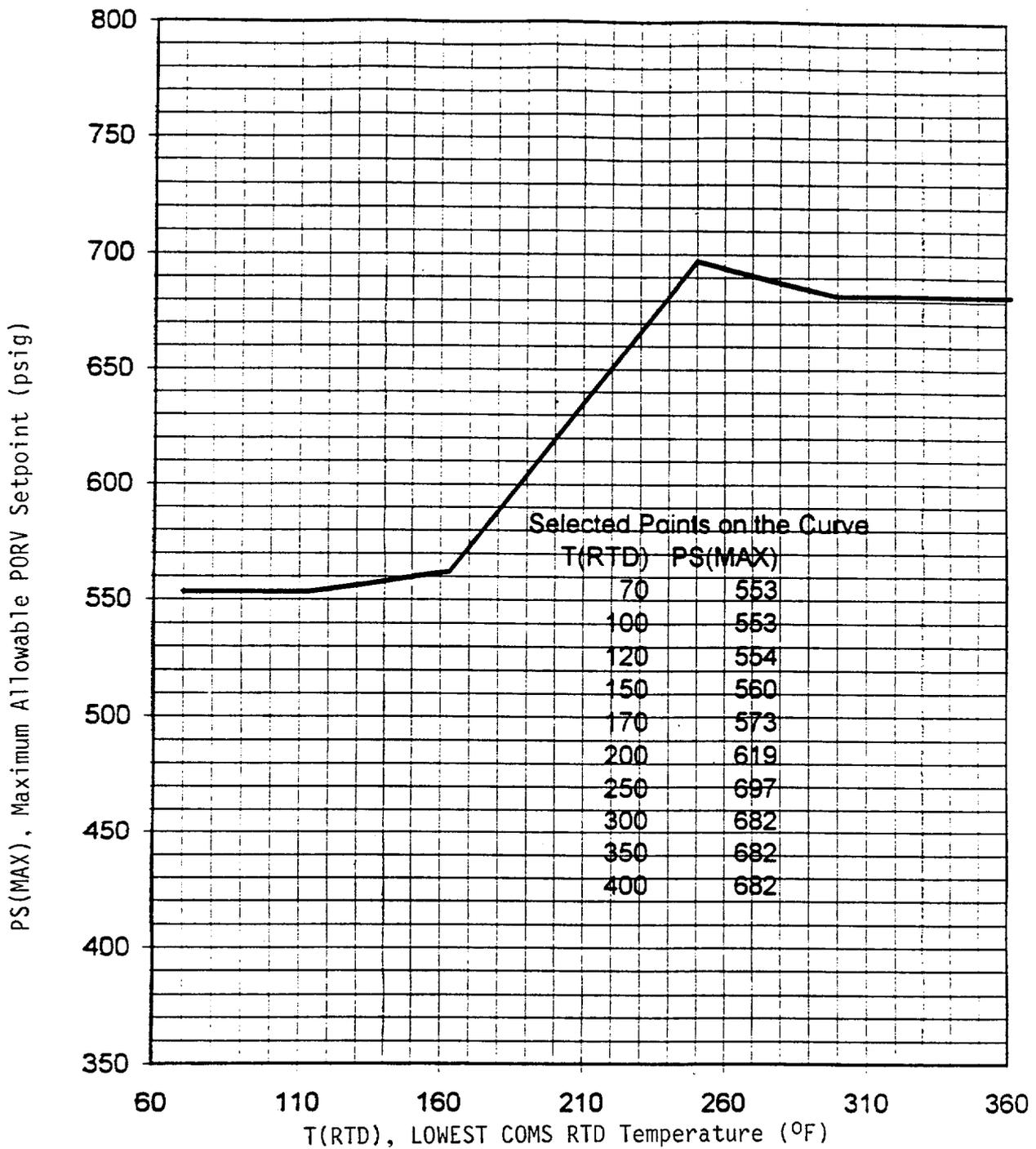


FIGURE 3.4-4a  
 NOMINAL PORV PRESSURE RELIEF SETPOINT VERSUS  
 RCS TEMPERATURE FOR THE COLD OVERPRESSURE PROTECTION SYSTEM  
 APPLICABLE UP TO 16 EFPY (UNIT 1)



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 64 TO FACILITY OPERATING LICENSE NO. NPF-72  
AND AMENDMENT NO. 64 TO FACILITY OPERATING LICENSE NO. NPF-77

COMMONWEALTH EDISON COMPANY

BRAIDWOOD STATION, UNIT NOS. 1 AND 2

DOCKET NOS. STN 50-456 AND STN 50-457

1.0 INTRODUCTION

Commonwealth Edison Company (ComEd) proposed to amend Facility Operating License No. NPF-72 and Facility Operating License No. NPF-77 for the Braidwood Station, Unit Nos. 1 and 2, respectively, by letters dated June 8, 1995, which superseded ComEd's December 16, 1994, request in its entirety, and additional related correspondence dated November 30, 1994, April 27, May 5, May 11 and June 23, 1995. Commonwealth Edison Company submitted changes to the low temperature overpressure protection (LTOP) system in the Braidwood, Unit 1, Technical Specifications (TS). The licensee proposed to revise the Power-Operated Relief Valve (PORV) pressure relief setpoint versus reactor coolant system temperature graphs. The revised graphs extended the applicable period from 5.37 Effective Full Power Year (EFPY) to 16 EFPY. The setpoints were supported by a pressure-temperature (P-T) limit curve for 16 EFPY. The June 23, 1995, letter, corrected a collating error in the June 8, 1995, submittal and did not change the initial proposed no significant hazards consideration determination.

The PORVs variable setpoints are used to protect the reactor coolant systems (RCS) from overpressure during low temperature operating conditions at Braidwood plant. The residual heat removal (RHR) suction relief valve with a lift setting of 450 psig is used to back up the PORVs. The PORV setpoints for overpressure mitigation applicable up to 5.37 EFPY are specified in the current TS Figure 3.4-4a. The licensee predicts that Braidwood, Unit 1, will reach 5.37 EFPY in early August 1995.

In the letter dated November 30, 1994, the licensee requested an exemption from the requirements of 10 CFR 50.60, "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation," to allow the use of the safety margins recommended in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-514, "Low Temperature Overpressure Protection". The NRC granted this exemption on July 13, 1995. The licensee incorporated the provision provided in ASME Code Case N-514 in developing the P-T limit curve.

The staff evaluated the P-T limits based on the following NRC regulations and guidance: 10 CFR Part 50, Appendix G; Generic Letters (GL) 88-11 and 92-01; Regulatory Guide (RG) 1.99, Revision 2; and Standard Review Plan (SRP) Section 5.3.2. Appendix G to 10 CFR Part 50 requires that P-T limits for the reactor vessel must be at least as conservative as those obtained by Appendix G to Section III of the ASME Code. Generic Letter 88-11 provides that licensees should use the methods in RG 1.99, Revision 2, to predict the effect of neutron irradiation by calculating the adjusted reference temperature (ART) of reactor vessel materials. The ART is defined as the sum of initial nil-ductility transition reference temperature ( $RT_{ndt}$ ) of the material, the increase in  $RT_{ndt}$  caused by neutron irradiation, and a margin to account for uncertainties in the prediction method. The increase in  $RT_{ndt}$  is calculated from the product of a chemistry factor and a fluence factor. The chemistry factor is calculated using surveillance data, obtained by the licensee's surveillance program, as directed by RG 1.99, Revision 2, Position 2.

Standard Review Plan 5.3.2 provides guidance on calculation of the P-T limits using linear elastic fracture mechanics methodology specified in Appendix G to Section III of the ASME Code. The linear elastic fracture mechanics methodology postulates sharp surface defects that are normal to the direction of maximum stress and have a depth of one-fourth of the reactor vessel beltline thickness ( $1/4T$ ) and a length of  $1-1/2$  the beltline thickness. The critical locations in the vessel for this methodology is the  $1/4T$  and  $3/4T$  locations, which correspond to the maximum depth of the postulated inside surface and outside surface defects, respectively.

The staff reviewed the P-T limit curve and the LTOP curve to confirm that the LTOP are bounded by the P-T limits.

## 2.0 EVALUATION

### 2.1 P-T Limit Curve

For the Braidwood, Unit 1, reactor vessel, the licensee determined that the circumference weld material between the intermediate and lower shells, WF562, is the limiting material for both the  $1/4T$  and  $3/4T$  locations. Using surveillance data, the licensee calculated an ART of 76.6 °F at the  $1/4T$  location and 65.4 °F at the  $3/4T$  location at 16 EFPY. The neutron fluence used in the ART calculation was  $0.673 \times 10^{19}$  n/cm<sup>2</sup> at the  $1/4T$  location and  $0.243 \times 10^{19}$  n/cm<sup>2</sup> at the  $3/4T$  location. The fluences were calculated based on an ID fluence of  $1.120 \times 10^{19}$  n/cm<sup>2</sup> for 16 EFPY.

The staff used the surveillance data in WCAP-12685 and WCAP-14241, Braidwood, Unit 1, analyses of surveillance capsules U and X respectively, to perform an independent calculation of the ART values for the limiting materials using RG 1.99, Revision 2, Position 2. The staff determined that the surveillance data satisfied the credibility criteria (see Table 1, below). Based on the staff's calculation, the staff verified that the licensee's calculated ARTs for Braidwood, Unit 1, are acceptable.

TABLE 1  
SURVEILLANCE CREDIBILITY

Capsule	Fluence	Material	Measured $\Delta RT_{ndt}$	Pred $\Delta RT_{ndt}$ From Surv. Data (+28 °F -- 1 Sigma)
U	$0.379 \times 10^{19}$	WF562	10°F	43.1°F
X	$1.144 \times 10^{19}$	WF562	25°F	49.4°F

Substituting the ARTs into equations in SRP 5.3.2, the staff verified that the proposed P-T limit for isothermal conditions at 16 EFPY (without the 40°F criticality adjustment) satisfies the requirements in Paragraphs IV.A.2 of 10 CFR Part 50, Appendix G. The two assumptions of isothermal conditions and non-criticality are consistent with LTOP setpoints determinations. In addition to beltline materials, 10 CFR Part 50, Appendix G, also imposes a minimum temperature at the closure head flange based on the reference temperature for the flange material. Section IV.A.2 of Appendix G states that when the pressure exceeds 20 percent of the preservice system hydrostatic test pressure, the temperature of the closure flange regions highly stressed by the bolt preload must exceed the reference temperature of the material in those regions by at least 120 °F for normal operation and by 90 °F for hydrostatic pressure tests and leak tests. Based on the flange  $RT_{ndt}$  of -10 °F for Unit 1 provided by the licensee, the staff has determined that the proposed P-T limit curve has satisfied the requirement for the closure flange region.

## 2.2 LTOP CURVE

In the current TS, when the temperature of the RCS cold leg is less than or equal to 350 °F (mode 4 and below), LTOP is provided by either the PORV with the lift settings specified in TS Figure 3.4-4a or the RHR relief valve with a lift setting of 450 psig. The PORV setpoints were developed to avoid RCS pressures from exceeding either the reactor vessel Appendix G limit or the limit established to protect the PORV discharge piping from water hammer effects. A maximum PORV setpoint of 638 psig was provided to protect piping in the temperature region where the pressure limit to piping becomes more limiting. The design transients considered in the LTOP include: 1) the start of an idle reactor coolant pump with secondary water temperature in the steam generator less than or equal to 50 °F above the RCS cold leg temperature, or 2) the mass addition transient involving a single centrifugal charging pump operating with the charging line flow control valve fully open and the letdown line flow control valve failed closed. Also, LTOP analysis assumes a water solid RCS.

By letter dated June 8, 1995, the licensee proposed a new TS Figure 3.4-4a which is applicable up to 16 EFPY. As the basis for generating the revised Figure 3.4-4a, a revised 10 CFR Part 50, Appendix G, P-T limit curve was

generated for 16 EFY. The licensee also applied for an exemption from the Appendix G requirement by using the ASME Code Case N-514 which allows the peak transient pressure to reach 10 percent above the Appendix G limit for the purpose of LTOP design. The methodology used to develop these new PORV setpoints is essentially same as that previously used for LTOP design at Braidwood plant. In response to the staff request, the proper instrumentation uncertainties have been factored in the setpoints study. A maximum PORV setpoint of 800 psig is used in the proposed Figure 3.4-4a for piping protection. In response to the staff request, the licensee indicated that its evaluation confirms that a PORV setpoint of 800 psig will provide adequate protection to the PORV discharge piping. The licensee has provided a tabulation of data from the results of its analysis for the staff review. These data indicate that at various RCS temperature conditions, the peak transient pressures will not exceed the P-T limits established by: 1) the Appendix G curve applicable up to 16 EFY in combination with the provisions provided in ASME Code Case N-514, and 2) the pressure limit to protect the PORV discharge piping.

To ensure that the assumptions made in the LTOP analysis are consistent with the restrictions of the TS, the staff has reviewed and confirmed that current TS 3.4.1.3, 3.4.1.4.1, 3.5.3, 3.5.4.1, 3.1.2.1, and 3.1.2.3 have provided adequate restriction to assure that the potential pressure transients are adequately bounded by the LTOP analysis performed at Braidwood.

In response to the staff request, the licensee has evaluated its design of the RHR system with respect to the potential overpressure of the RHR system during a postulated LTOP transient. The licensee has confirmed that the RHR system can withstand a more severe transient than the scenarios assumed in the LTOP analysis and, therefore, there is no concern regarding RHR overpressure during an LTOP event.

The licensee's proposed changes in TS Figure 3.4-4a reflect the changes discussed above. The staff has reviewed the licensee's submittal and finds that the changes are based on the applicable regulatory guidance in SRP 5.2.2 (Revision 2), are reasonably conservative, and are acceptable.

### 3.0 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.

### 4.0 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 (60 FR 32360). 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.

## 5.0 CONCLUSION

The staff has performed an independent analysis to verify the licensee's proposed P-T limits. The staff concludes that the proposed P-T limits are valid for 16 EFPY because: 1) the limits conform to the requirements of 10 CFR Part 50, Appendix G, and GL 88-11, and 2) the surveillance data used in calculating the P-T limits are consistent with data submitted to the staff in surveillance reports. Hence, the proposed P-T limits may be used to determine the LTOP setpoints. The curves will not be used for P-T limits in the TSs. The P-T limit curves for 32 EFPY were approved in a letter dated July 29, 1994, from the NRC to Commonwealth Edison Company.

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.

Principal Contributors: C. Liang  
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R. Assa

Dated: July 24, 1995