

July 26, 2000

Mr. James Scarola, Vice President
Shearon Harris Nuclear Power Plant
Carolina Power & Light Company
Post Office Box 165, Mail Code: Zone 1
New Hill, North Carolina 27562-0165

SUBJECT: EXEMPTION FROM THE REQUIREMENTS OF 10 CFR PART 50, SECTION 50.60(a) AND APPENDIX G - SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1 (TAC NO. MA8643)

Dear Mr. Scarola:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Section 50.60(a) and Appendix G, for the Shearon Harris Nuclear Power Plant, Unit 1 (HNP). This action is in response to your letter of April 12, 2000, as supplemented on June 2, 2000, that submitted new pressure-temperature (P-T) limits and low temperature overpressure protection (LTOP) system setpoints for HNP. The new P-T limits and LTOP setpoints were developed using the methodologies in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-640, "Alternative Reference Fracture Toughness for Development of P-T Limit Curves for ASME Section XI, Division 1," instead of the methodologies in 10 CFR Part 50, Appendix G.

Your letter of April 12, 2000, also included a request to amend your license to change certain Technical Specifications. That request is being handled concurrently with your exemption request, but as a separate action.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Richard J. Laufer, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-400

Enclosure: Exemption

cc w/encl: See next page

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of)	
)	
Carolina Power & Light Company)	Docket No. 50-400
)	
(Shearon Harris Nuclear Power Plant,)	
Unit 1))	

EXEMPTION

I.

Carolina Power & Light Company (CP&L or the licensee) is the holder of Facility Operating License No. NPF-63, which authorizes operation of the Shearon Harris Nuclear Power Plant, Unit 1 (HNP). The facility consists of one pressurized-water reactor located at the licensee's site in Wake and Chatham Counties, North Carolina. The license provides, among other things, that the licensee is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

II.

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix G requires that pressure-temperature (P-T) limits be established for reactor pressure vessels (RPVs) during normal operation, and hydrostatic pressure or leak testing conditions. Specifically, 10 CFR Part 50, Appendix G states that “[t]he appropriate requirements on...the pressure-temperature limits and minimum permissible temperature must be met for all conditions.”

Appendix G of 10 CFR Part 50 specifies that the requirements for these limits are the American Society of Mechanical Engineers (ASME) Code, Section XI, Appendix G Limits. Both 10 CFR Part 50, Appendix G and the ASME Code require that the effects of neutron irradiation on the material properties of the RPV be considered. Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials," dated May 1988, provides an acceptable method to account for these effects.

To address provisions of amendments to the technical specifications (TS) P-T limits and low temperature overpressure protection (LTOP) system setpoints, the licensee requested in its submittal dated April 12, 2000, as amended by letter dated June 2, 2000, that the staff exempt HNP from application of specific requirements of 10 CFR Part 50, Section 50.60(a) and Appendix G, and substitute use of ASME Code Case N-640. Code Case N-640 permits the use of an alternate reference fracture toughness (K_{IC} fracture toughness curve instead of K_{Ia} fracture toughness curve) for reactor vessel materials in determining the P-T limits and LTOP setpoints. Since the K_{IC} fracture toughness curve shown in ASME Section XI, Appendix A, Figure A-2200-1 (the K_{IC} fracture toughness curve) provides greater allowable fracture toughness than the corresponding K_{Ia} fracture toughness curve of ASME Section XI, Appendix G, Figure G-2210-1 (the K_{Ia} fracture toughness curve), using Code Case N-640 for establishing the P-T limits and LTOP setpoints would be less conservative than the methodology currently endorsed by 10 CFR Part 50, Appendix G and, therefore, an exemption to apply the Code Case would be required by 10 CFR 50.60. It should be noted that although Code Case N-640 was incorporated into the ASME Code recently, an exemption is still needed because the proposed P-T limits and LTOP setpoints (excluding Code Case N-640) are based on the 1989 edition of the ASME Code.

The proposed amendment will revise both the P-T limits of TS 3/4.4.9.2 related to the heatup and cooldown of the reactor coolant system (RCS), and the LTOP setpoints of TS 3/4.4.9.4, for operation to 36 effective full-power years (EFPYs).

The licensee has proposed an exemption to allow use of ASME Code Case N-640 in conjunction with ASME Section XI, 10 CFR 50.60(a) and 10 CFR Part 50, Appendix G, to determine P-T limits and LTOP setpoints.

The proposed amendment to revise the P-T limits and LTOP setpoints for HNP relies in part on the requested exemption. These revised P-T limits and LTOP setpoints have been developed using the K_{Ic} fracture toughness curve, in lieu of the K_{Ia} fracture toughness curve, as the lower bound for fracture toughness of the RPV materials.

Use of the K_{Ic} curve in determining the lower bound fracture toughness in the development of P-T operating limit curves and LTOP setpoints is more technically correct than use of the K_{Ia} curve since the rate of loading during a heatup or cooldown is slow and is more representative of a static condition than a dynamic condition. The K_{Ic} curve appropriately implements the use of static initiation fracture toughness behavior to evaluate the controlled heatup and cooldown process of a reactor vessel. The staff has required use of the conservatism of the K_{Ia} curve since 1974, when the curve was adopted by the ASME Code. This conservatism was initially necessary due to the limited knowledge of the fracture toughness of RPV materials at that time. Since 1974, additional knowledge has been gained about RPV materials, which demonstrates that the lower bound on fracture toughness provided by the K_{Ia} curve greatly exceeds the margin of safety required to protect the public health and safety from potential RPV failure. In addition, P-T curves and LTOP setpoints based on the K_{Ic} curve will enhance overall plant safety by opening the P-T operating window, with the greatest safety benefit in the region of low temperature operations.

Since an unnecessarily reduced P-T operating window can reduce operator flexibility without just basis, implementation of the proposed P-T curves and LTOP setpoints as allowed by ASME Code Case N-640 may result in enhanced safety during critical plant operational periods, specifically heatup and cooldown conditions. Thus, pursuant to 10 CFR 50.12(a)(2)(ii), the underlying purpose of 10 CFR 50.60 and Appendix G to 10 CFR Part 50 will continue to be served.

In summary, the ASME Section XI, Appendix G, procedure was conservatively developed based on the level of knowledge existing in 1974 concerning RPV materials and the estimated effects of operation. Since 1974, the level of knowledge about these topics has been greatly expanded. The NRC staff concurs that this increased knowledge permits relaxation of the ASME Section XI, Appendix G requirements by application of ASME Code Case N-640, while maintaining, pursuant to 10 CFR 50.12(a)(2)(ii), the underlying purpose of the NRC regulations to ensure an acceptable margin of safety.

III.

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50, when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. The staff accepts the licensee's determination that exemption would be required to approve the use of Code Case N-640. The staff examined the licensee's rationale to support the exemption requests and concurred that the use of the Code case would meet the underlying intent of these regulations. Based upon a consideration of the conservatism that is explicitly incorporated into the methodologies of 10 CFR Part 50, Appendix G; Appendix G of the Code; and Regulatory Guide 1.99, Revision 2, the staff

concludes that application of the Code case as described would provide an adequate margin of safety against brittle failure of the RPV. This conclusion is also consistent with the determinations that the staff has reached for other licensees under similar conditions based on the same considerations. Therefore, the staff concludes that requesting an exemption under the special circumstances of 10 CFR 50.12(a)(2)(ii) is appropriate and that the methodology of Code Case N-640 may be used to revise the P-T limits and LTOP setpoints for HNP.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not endanger life or property or common defense and security, and is, otherwise, in the public interest. Therefore, the Commission hereby grants Carolina Power & Light Company an exemption from the requirements of 10 CFR Part 50, Section 50.60(a) and 10 CFR Part 50, Appendix G, for HNP.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of the exemption will not result in any significant effect on the quality of the environment (65 FR 45628).

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

John A. Zwolinski, Director
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland,
this 26 day of July 2000

Mr. James Scarola
Carolina Power & Light Company

Shearon Harris Nuclear Power Plant
Unit 1

cc:

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