

October 12, 2000

Mr. Harold W. Keiser  
Chief Nuclear Officer & President  
PSEG Nuclear LLC - X04  
Post Office Box 236  
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK GENERATING STATION AND SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 - EVALUATION OF RELIEF REQUEST - USE OF ASME CODE CASE N-597 AS AN ALTERNATIVE ANALYTICAL EVALUATION OF WALL THINNING (TAC NOS. MA8595, MA8600, AND MA8601)

Dear Mr. Keiser:

By letter dated March 17, 2000, as supplemented by letters dated July 7 and September 27, 2000, Public Service Electric and Gas Company (PSE&G) submitted a request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the Code), Section XI, (IWA-3100). PSE&G proposed an alternative to use of the provisions of ASME Code Case N-597 for the analytical evaluation of Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to wall thinning as a result of flow-accelerated or other corrosion phenomena at the Hope Creek Generating Station (Hope Creek) and Salem Nuclear Generating Station, Unit Nos. 1 and 2, (Salem). In addition, on August 21, 2000, the licenses for Salem and Hope Creek, to the extent held by PSE&G, were transferred to PSEG Nuclear Limited Liability Company (PSEG Nuclear). By letter dated September 6, 2000, PSEG Nuclear stated that it has assumed responsibility, as of the date of the transfer, for the active items on the Salem and Hope Creek dockets previously submitted by PSE&G, including the subject relief request.

The NRC staff has completed the review of the subject relief request. The NRC staff's Safety Evaluation is enclosed, and concludes that the proposed alternative will provide an acceptable level of quality and safety. Therefore, the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for Salem and Hope Creek until such time as this code case is incorporated into 10 CFR Part 50. At that time, if PSEG Nuclear intends to continue to implement Code Case N-597, it would need to follow all the provisions of the code case, with limitations issued in the rule, if any.

Sincerely,

*/RA/*

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

Docket Nos. 50-354, 50-272, and 50-311

Enclosure: Safety Evaluation

cc w/encl: See next page

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ACCESSION NUMBER: ML003756221    TEMPLATE = NRR-028    \* See previous concurrence

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Salem Nuclear Generating Station, Unit Nos. 1 and 2, and Hope Creek Generating Station

cc:

Mr. Elbert C. Simpson  
Senior Vice President &  
Chief Administrative Officer  
PSEG Nuclear - N19  
P.O. Box 236  
Hancocks Bridge, NJ 08038

Mr. Mark B. Bezilla  
Vice President - Operations  
PSEG Nuclear - X10  
P.O. Box 236  
Hancocks Bridge, NJ 08038

Mr. David F. Garchow  
Vice President - Technical Support  
PSEG Nuclear - X10  
P.O. Box 236  
Hancocks Bridge, NJ 08038

Mr. Gabor Salamon  
Manager - Licensing  
PSEG Nuclear - N21  
P.O. Box 236  
Hancocks Bridge, NJ 08038

Jeffrie J. Keenan, Esquire  
PSEG Nuclear - N21  
P.O. Box 236  
Hancocks Bridge, NJ 08038

Mr. Carter Kresge  
External Operations - Nuclear  
Conectiv  
P.O. Box 6066  
Newark, DE 19714-6066

Ms. R. A. Kankus  
Joint Owner Affairs  
PECO Energy Company  
Nuclear Group Headquarters KSA1-E  
200 Exelon Way  
Kennett Square, PA 19348

Lower Alloways Creek Township  
c/o Mary O. Henderson, Clerk  
Municipal Building, P.O. Box 157  
Hancocks Bridge, NJ 08038

Dr. Jill Lipoti, Asst. Director  
Radiation Protection Programs  
NJ Department of Environmental  
Protection and Energy  
CN 415  
Trenton, NJ 08625-0415

Richard Hartung  
Electric Service Evaluation  
Board of Regulatory Commissioners  
2 Gateway Center, Tenth Floor  
Newark, NJ 07102

Assistant Consumer Advocate  
Office of Consumer Advocate  
1425 Strawberry Square  
Harrisburg, PA 17120

Public Service Commission of Maryland  
Engineering Division  
Chief Engineer  
6 St. Paul Centre  
Baltimore, MD 21202-6806

Maryland Office of People's Counsel  
6 St. Paul Street, 21st Floor  
Suite 2102  
Baltimore, MD 21202

Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Senior Resident Inspector  
Salem Nuclear Generating Station  
U.S. Nuclear Regulatory Commission  
Drawer 0509  
Hancocks Bridge, NJ 08038

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO THE USE OF CODE CASE N-597 AS AN ALTERNATIVE  
FOR THE ANALYTICAL EVALUATION OF CLASS 1, 2, AND 3  
CARBON AND LOW-ALLOY STEEL PIPING ITEMS  
PSEG NUCLEAR LLC  
HOPE CREEK GENERATING STATION  
SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2  
DOCKET NOS. 50-354, 50-272, AND 50-311

1.0 INTRODUCTION

By letter dated March 17, 2000, as supplemented by letters dated July 7 and September 27, 2000, Public Service Electric and Gas Company (PSE&G) submitted a request for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (the ASME Code), Section XI, (IWA-3100). Paragraph IWA provides the process for the disposition of flaw examination evaluations that exceed the acceptance standards for materials and welds specified in the Section III Edition applicable to the construction of the component. On August 21, 2000, the licenses for Salem and Hope Creek, to the extent held by PSE&G, were transferred to PSEG Nuclear Limited Liability Company (PSEG Nuclear/licensee). By letter dated September 6, 2000, PSEG Nuclear stated that it has assumed responsibility, as of the date of the transfer, for the active items on the Salem and Hope Creek dockets previously submitted by PSE&G, including the subject relief request. PSEG Nuclear proposes to use the provisions of ASME Code Case N-597 for the analytical evaluation of Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to wall thinning as a result of flow-accelerated or other corrosion phenomena at the Hope Creek Generating Station (Hope Creek) and Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem).

2.0 BACKGROUND

The inservice inspection of the ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 50.55a(g), except where alternatives have been authorized by the Commission pursuant to 10 CFR 50.55a(a)(3). Section 50.55a(a)(3) states, in part, that alternatives to the requirements may be used provided the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety; or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

ENCLOSURE

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein, and subject to Commission approval. The applicable ASME Code edition and addenda are as follows:

- Salem Unit 1 - 1983 Edition, summer 1983 Addenda;
- Salem Unit 2 - 1986 Edition, no Addenda; and
- Hope Creek - 1989 Edition, no Addenda.

By letter dated March 17, 2000, as supplemented by letters dated July 7 and September 27, 2000, the licensee submitted a request for the use of Code Case N-597 as an alternative to the requirements of the ASME Code, Section XI (IWA-3100). Paragraph IWA-3100 specifies the process for the disposition of flaw examination evaluations that exceed the acceptance standards for materials and welds specified in the ASME Code, Section III Edition applicable to the construction of the component. This requirement is identical for all three units. The request provides for an analytical evaluation of Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to wall thinning as a result of flow-accelerated or other corrosion phenomenon. Clarifying information was also provided in the licensee's letter dated September 27, 2000.

## 2.1 ASME Section XI Code Requirement

The ASME Code Section XI (IWA-3100) provides the process for the disposition of flaw examination evaluations which exceed the acceptance standards, such as minimum wall thickness, for materials and welds specified in the ASME Code Section III Edition applicable to the construction of the component. This provision stipulates that the disposition shall be subjected to review by the regulatory and enforcement authorities having jurisdiction at the plant site. This requirement is identical for Hope Creek and Salem.

## 2.2 Proposed Alternative

As an alternative to the requirements of IWA-3100, "Evaluation", the licensee proposes to use the provisions of ASME Code Case N-597 for the analytical evaluation of Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to wall thinning as a result of flow-accelerated or other corrosion phenomena rather than to repair the component if the construction code minimum wall thickness has been reached. This code case stipulates that the methods of predicting the rate of wall thickness loss and the predicted remaining wall thickness shall be the responsibility of the owner (PSEG Nuclear). The licensee currently has plant procedures in place which provide detailed requirements for calculating remaining life, predicting remaining wall thickness, and calculating wear rates. The calculation of wear rates consists of using a point-to-point calculation or the band methodology.

### 3.0 EVALUATION

The ASME Code requires that a component whose flaws exceed the acceptance standards, such as minimum wall thickness, shall be evaluated to determine disposition which shall be subjected to review by the regulatory and enforcement authorities having jurisdiction at the plant site. As an alternative to the code requirements, the licensee has proposed to use Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning," Section XI, Division 1 for Class 1, 2, and 3 carbon and low-alloy steel piping items at Hope Creek and Salem. The staff has previously reviewed this code case in preparing its position for incorporation into 10 CFR Part 50 and determined that it is conditionally acceptable. Since the code case does not address inspection requirements and wall thinning rates, the staff has determined that the code case needs to be reviewed and approved prior to use.

Code Case N-597 provides an acceptable approach for determining the structural integrity of components degraded by wall thinning as a result of flow-accelerated or other corrosion phenomena. The methodology specified in the code case is sufficiently conservative, and thus provides an adequate margin of safety for evaluating a component's structural integrity. However, the NRC staff has determined that Code Case N-597 needs to be supplemented by licensees on a case-by-case basis to address the methodology for determining the rate of wall thickness loss and for conducting component inspections. Therefore, for the staff to find the use of this code case acceptable, the licensee's program must include procedures to calculate wear rates, forecast remaining life, and conduct inspections.

The licensee stated that its procedures are based on Nuclear Energy Institute (NEI) document NSAC-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program" and satisfy the guidance provided by Generic Letter 89-08, "Erosion/Corrosion Induced Pipe Wall Thinning" for Hope Creek and Salem. The staff considers the guidance for calculating wear rates, determining remaining life, predicting wall thickness, and conducting inspections contained in NSAC-202L to be acceptable, provided that many of the recommendations characterized by the use of the word "should" are, in fact, performed. The licensee, through its implementing procedures, has eliminated the ambiguities in NSAC-202L; in particular, the licensee clarified its use of the following definitions contained in its procedures governing the flow-accelerated corrosion program:

Shall is to be adhered to without exception. It can be either a regulatory requirement, commitment or Nuclear Business requirement.

Should denotes a management expectation that is to be adhered to unless Supervision determines otherwise.

The licensee further clarified that management expectations are the same for both terms, and that the use of these terms is simply a mechanism to distinguish actions that have a direct regulatory requirement or licensee commitment basis versus those which do not. This information was provided in a summary of the licensee's alternative dated September 27, 2000.

The staff notes that acceptance of this code case does not affect the requirement in the licensee's ASME Code of record that components to which Code Case N-597 is applied are to be repaired or replaced in accordance with the construction code of record and owners' requirements, or a later approved edition of the ASME Code, Section III.

Therefore, the staff finds that the licensee's alternative to the use of Code Case N-597, and NEI document NSAC-202L, with clarifications of the application of "shall" and "should" in the document, provides an acceptable level of quality and safety.

#### 4.0 CONCLUSION

Based on its review, the staff finds that the proposed alternative to use Code Case N-597 as an alternative evaluation for Class 1, 2, and 3 carbon and low-alloy steel piping items is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for Salem and Hope Creek until such time as this code case is incorporated into 10 CFR Part 50. At that time, if PSEG Nuclear intends to continue to implement Code Case N-597, it would need to follow all the provisions of the code case, with limitations issued in the rule, if any. Furthermore, code components must be repaired or replaced in accordance with the construction code of record and the owners' requirements, or a later approved edition of ASME Section III, prior to reaching the allowable minimum wall thickness, as specified in this code case.

Principal Contributor: C. Lauron

Date: October 12, 2000