

December 29, 2004

Mr. Bryce L. Shriver  
President, PPL Generation, LLC and  
Chief Nuclear Officer  
PPL Generation, LLC  
2 North Ninth Street  
Allentown, PA 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2 - REQUEST TO USE  
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CODE  
CASE N-663 (TAC NO. MC2380)

Dear Mr. Shriver:

In a letter dated March 5, 2004, PPL Susquehanna, LLC (PPL, the licensee), submitted Relief Request No. 27, proposing an alternative to the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements for inservice inspection (ISI) programs at Susquehanna Steam Electric Station, Unit 2 (SSES 2). In lieu of the ASME Code requirements, PPL proposes to use ASME Code Case-663, "Alternative Requirements for Class 1 and 2 Surface Examinations," as an alternative to the surface examination requirements of Class 1, Examination Categories B-F and B-J piping welds (N8A and N8B nozzles) at SSES 2.

The applicable inspection interval for this request is the second 10-year ISI interval which began on June 1, 1994, and ended on May 31, 2004. The ISI Code of record for the second 10-year interval is the 1989 Edition with no Addenda of the ASME Code.

Based on the information provided by PPL, the Nuclear Regulatory Commission (NRC) staff concluded on May 24, 2004, that the proposed alternative will provide an acceptable level of quality and safety and that the use of the proposed alternative is authorized pursuant to Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.55a(a)(3)(i) for the second 10-year ISI interval. This letter documents the NRC staff's conclusion of acceptability. The NRC staff's safety evaluation is enclosed.

If you have any questions, please contact Rich Guzman, at (301) 415-1030.

Sincerely,

***/RA by Peter Tam for/***

Richard J. Laufer, Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-388

Enclosure: Safety Evaluation

cc w/encl: See next page

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ACCESSION NO.: ML 043630230 \*SE provided. No major changes made.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO RELIEF REQUEST NO. 27 TO USE  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) CODE CASE-663 AS AN  
ALTERNATIVE TO THE SURFACE EXAMINATION REQUIREMENTS  
OF ASME, SECTION XI, TABLE IWB-2500-1 FOR  
PPL SUSQUEHANNA, LLC  
SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2  
DOCKET NO. 50-388

1.0 INTRODUCTION

By letter dated March 5, 2004, PPL Susquehanna, LLC (PPL, the licensee), submitted Relief Request No. 27, proposing an alternative to the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements for inservice inspection (ISI) programs at Susquehanna Steam Electric Station, Unit 2 (SSES 2). The applicable inspection interval for this relief request is the second 10-year ISI interval which began on June 1, 1994, and ended on May 31, 2004. The ISI Code of record for the second 10-year interval for SSES 2 is the 1989 Edition with no Addenda of the ASME Code, Section XI.

The ISI of the ASME Code, Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.55a(g) (10 CFR 50.55a(g)), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if 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.

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 pre-service 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. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

## 2.0 REGULATORY EVALUATION

### 2.1 Code Requirements

The 1989 Edition of the ASME Code, Section XI, IWB-2500 requires components be examined and tested as specified in Table IWC-2500-1. These tables require piping welds as well as other components be subjected to various types of non-destructive examinations (i.e. volumetric and/or surface examinations) and pressure testing (i.e., visual, VT-2).

### 2.2 PPL's Code Relief Request and its Proposed Alternative

PPL proposes to use ASME Code Case N-663 as an alternative to the surface examination requirements of Section XI, Table IWB-2500-1, Examination Categories B-F and B-J. All areas of the subject welds identified as susceptible to outside surface attack shall be surface examined in accordance with Code Case N-663.

### 2.3 Components for which Relief Is Requested

Section XI, IWB-2500-1, Examination Categories B-F and B-J, Item Numbers B5.10 and B9.11, Class 1 piping welds (NPS 4 and larger).

### 2.4 PPL's Basis for the Proposed Alternative

The ASME Code, Section XI, Task Group on ISI Optimization, Report No. 92-01-01, "Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds in Piping," dated July 1995, concluded that only 2 welds (0.02%) were found to have flaws detected by Section XI surface examinations, with 50 units responding and a total of 9,333 welds inspected. These flaws were determined to be fabrication-induced.

In parallel with the above, several risk-informed ASME Code cases have been developed for use on piping welds (e.g., ASME Code Cases N-560, N-577, and N-578). One of the methods for risk-informed piping examinations is through the use of Electric Power Research Institute (EPRI) TR-112657, Revision B, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," approved by an NRC Safety Evaluation Report dated October 28, 1999 (Agencywide Documents Access and Management System Accession No. ML993190474). Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods," of the EPRI report lists the required degradation mechanisms to be evaluated in Class 1, 2, and 3 piping. It identifies the risk-informed examination method required for each of these degradation mechanisms. The only degradation mechanism that requires a surface examination is outside diameter (O.D.) chloride cracking. These two initiatives led ASME to investigate the value of surface examinations.

Code Case N-663 incorporates lessons learned from the risk-informed initiatives and industry examination experience into Section XI by requiring that an evaluation be conducted to identify locations, if any, where a surface examination would be of benefit from a generic piping degradation perspective. The results of this evaluation identify where O.D. degradation is most likely to occur by reviewing plant-specific programs, practices, and operating experience. If the potential for degradation is identified, Code Case N-663 defines examination techniques, volumes, and frequencies. As such, implementing Code Case N-663 will identify appropriate locations for surface examination, if any, and eliminate unnecessary examinations. Other ASME Code, Section XI, examination requirements (subject to approved relief requests) for the subject welds, including volumetric examinations and pressure testing, will continue to be performed.

### 3.0 TECHNICAL EVALUATION

The proposed use of Code Case N-663 by PPL to replace the ASME Code, Section XI, required surface examinations for piping welds of Examination Categories B-F and B-J is consistent with the approved underlying EPRI and Westinghouse methodologies on risk-informed ISI contained in TR-112657, Revision B-A, and WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report." Although the two topical reports use different approaches, both have reached their objectives of identifying the risk-important areas of the piping systems and defining the appropriate examination methods, examination volumes, procedures, and evaluation standards necessary to address the degradation mechanisms of concern and the ones most likely to occur at each location to be inspected. Risk-informed ISI analyzes specific pipe segments for probability of failure and operational safety significance.

With regard to the current issue of surface examinations for piping welds of Examination Categories B-F and B-J, all plants that performed risk-informed ISI of their Class 1 piping systems in accordance with the topical reports referenced above arrived at the conclusion that the only degradation mechanism that requires surface examination is O.D. chloride cracking. Consequently, within these plants, surface examination should be considered only when O.D. chloride cracking is identified as the degradation mechanism affecting the structural integrity of the subject piping welds.

Code Case N-663 provides that "...in lieu of the surface examination requirements for piping welds of Examination Categories B-F (NPS 4 and larger), B-J (NPS 4 and larger)...., surface examinations may be limited to areas identified by the Owner as susceptible to outside surface attack." The susceptibility criteria are listed in Table 1 of Code Case N-663 for two types of degradation mechanisms: 1) external O.D. chloride stress corrosion cracking, and 2) other outside surface initiated mechanisms. These other outside surface initiated mechanisms include thermal fatigue, boric acid corrosion, and any other owner identified mechanisms. The staff determined that the surface inspection requirements of Code Case N-663 are acceptable because the inspection requirements defined in the code case are comparable to the corresponding inspection requirements approved by the NRC and adopted by using risk-informed ISI programs. Further, the code case requires that licensees conduct a plant-specific service history review to identify other mechanisms which can result in outside surface attack, and to implement plant-specific processes and programs that minimize chlorides and other contaminants. Hence, the alternative provides reasonable assurance that the proposed



inspections will not lead to degraded piping performance when compared to the existing performance levels.

#### 4.0 CONCLUSION

Based upon review of the information provided by PPL in support of its request for relief, the NRC staff concludes that use of Code Case N-663 for Class 1 surface examinations, in lieu of the Table IWB-2500-1, Examination Categories B-F and B-J requirements, will provide an acceptable level of quality and safety.

This conclusion is based on the fact that inspection requirements defined in Code Case N-663 are comparable to the inspection requirements adopted by plants employing risk-informed ISI programs. Furthermore, the licensee will be required to conduct a plant-specific service history review to identify, in addition to chloride-induced mechanisms, other possible mechanisms that will cause outside surface attack upon subject plant components. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), PPL's proposed use of Code Case N-663 is authorized for SSES 2, for the second 10-year ISI interval, or until Code Case N-663 is published in a future version of Regulatory Guide (RG) 1.147. At that time, if PPL intends to continue implementing this code case, PPL must follow all provisions of Code Case N-663, if any, with limitations or conditions specified in RG 1.147. All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested remain applicable, including third party review by the authorized nuclear inservice inspector.

Principal Contributor: Z. Bart Fu

Date: December 29, 2004