

February 21, 2002

Mr. Robert G. Byram  
Senior Vice President  
and Chief Nuclear Officer  
PPL Susquehanna, LLC  
2 North Ninth Street  
Allentown, PA 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - RELIEF  
REQUEST FOR AUTHORIZATION TO USE CODE CASE N-516-2 AS AN  
ALTERNATIVE TO THE ASME CODE, SECTION XI, REQUIREMENTS  
(TAC NOS. MB3722 AND MB3723)

Dear Mr. Byram:

In a letter dated January 2, 2002, PPL Susquehanna, LLC, the licensee for the Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2), submitted Relief Request No. 25 (RR-25) for authorization to use American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Case N-516-2, "Underwater Welding, Section XI, Division 1." The licensee submitted the request pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), as a proposed alternative to the requirements of ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the proposed relief request against the requirements of ASME Code, Section XI, 1992 Edition, Subsection IWA-4000, 1992 Addenda. The results of the review are provided in the enclosed safety evaluation (SE).

The NRC staff has concluded that the proposed alternative to the ASME Code requirements requested in RR-25, with the specified conditions, would provide an acceptable level of quality and safety. Therefore, the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for implementation for the second 10-year interval of the Inservice Inspection Program for SSES Units 1 and 2. As discussed with members of your staff, the authorization to use the alternative is based upon an additional two conditions and the implementation of the limitation specified by the licensee as described in Section 2.2 of the enclosed SE.

R. Byram

-2-

If you have any questions, please contact your project manager, Timothy Colburn, at (301) 415-1402.

Sincerely,

*/RA/*

Joel T. Munday, Acting Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure: Safety Evaluation

cc w/encl: See next page

R. Byram

-2-

If you have any questions, please contact your project manager, Timothy Colburn, at (301) 415-1402.

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**ACCESSION NO.: ML020440786**

\*SE provided on 2/8/02. No major changes made.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO RELIEF REQUEST NO. 25 TO USE CODE CASE N-516-2 AS AN  
ALTERNATIVE TO THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

SECTION XI, REQUIREMENTS

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387 AND 388

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, Class 2, and Class 3, components is to be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Code and applicable editions and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulations in 10 CFR 50.55a(a)(3) state, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the U.S. Nuclear Regulatory Commission (NRC) staff, 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 preservice examination requirements, set forth in the ASME Code, Section XI, 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI Code of record for Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2), for the second 10-year interval is the 1992 Edition and 1992 Addendum of the ASME Code. 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.

In a letter dated January 2, 2002, the licensee requested relief from certain Code-required criteria. Specifically, the licensee proposed an alternative to perform a weld repair underwater according to ASME Code Case (CC) N-516-2, "Underwater Welding, Section XI, Division 1," for the second 10-year interval of the Inservice Inspection Program for SSES Units 1 and 2. The NRC staff has reviewed the information submitted by the licensee as discussed below.

## 2.0 RELIEF REQUEST NO. 25, ASME CODE CASE (CC) N-516-2, "UNDERWATER WELDING SECTION XI, DIVISION 1"

### 2.1 Code Requirement for which Relief is Requested

The licensee's repair and replacement code of record is the 1992 Edition with 1992 Addenda to Section XI of the ASME Code. ASME Code, Section XI, IWA-4000, "Repair and Replacement," requirements apply. However, the ASME Code does not address the requirements for underwater welding repairs, nor does it provide requirements on welding P-No. 1 carbon steel components underwater.

### 2.2 Licensee's Proposed Alternative to ASME Code

Pursuant to 10 CFR 50.55a(a)(3)(i), in the January 2, 2002, letter, the licensee proposed implementing the provisions of CC N-516-2, with the following limitation:

When welding is to be performed on high neutron fluence Class 1 material, then a mockup, using material with similar fluence levels, should be welded to verify that adequate crack prevention measures were used.

The proposal is for the second 10-year ISI interval.

### 2.3 Licensee's Basis for Alternative (as stated)

ASME [Code] Section XI, IWA-4000 (1992 edition with the 1992 addenda), does not address the requirements for welded repair or installation of replacement items by welding on ASME Class 1, 2, 3 and MC pressure boundary components when welding is performed underwater. To address this issue, ASME [Code] Section XI, has issued Code Case N-516-2, "Underwater Welding." Code Case N-516-2 provides welding methods and requirements that may be used when welding for a repair or replacement activity is performed underwater.

Code Case N-516-1 was approved by the ASME Boiler and Pressure Vessel Code Committee on December 31, 1996. Code Case N-516-2 (approved on January 17, 2000) is the reaffirmation of Code Case N-516-1, except for a few minor editorial changes. Code Case N-516-2 is not yet endorsed in the most recent listing of NRC approved code cases provided in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." The original version of the Code Case, N-516, is endorsed in Revision 12 of Regulatory Guide 1.147. However, this version of the subject Code Case is only applicable for use on P-No. 8 and P-No. 4X materials. Revisions 1 and 2 of the Code Case extend the applicability to underwater repairs and replacements made on

components made of P-No. 1, carbon steel materials as well. Authorization to use the guidance provided in Revision 2 of the subject Code Case will allow the [S]SES to control the performance of underwater welding in accordance with an appropriate industry standard that will adequately assure weld integrity.

The Code Case will provide appropriate controls over the welding processes that are needed to implement such repairs, replacements, and modifications in a safe and effective manner. [S]SES therefore regards these requirements as providing an acceptable level of quality and safety.

#### 2.4 Evaluation

The ASME Code did not address underwater welding until the 1996 Addenda, when CC N-516 was approved. The NRC staff reviewed the 1996 Addenda in the process of updating 10 CFR 50.55a to incorporate, by reference, the 1995 Edition with the 1996 Addenda of the ASME Code. Revision 1 to CC N-516 added welding of P-No. 1, carbon steel to the CC. CC N-516-2 has been reviewed and accepted with conditions in the Draft Regulatory Guide (DG)-1091 (proposed Revision 13 of Regulatory Guide (RG) 1.147), "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," currently issued for public comment (December 2001). CC N-516-2 provides guidelines for underwater welding of P-No. 1, P-No. 8 and P-No. 4X materials. P-No. 1 carbon steels are easier to weld than the austenitic steels approved in the original version of the CC. However, CC N-516-2 does not appropriately address the welder and procedure qualification relied upon to determine if the weld is degraded by hydrogen.

Paragraph 3.2 in CC N-516-2 allows for welder qualifications, a radiographic examination in lieu of a mechanical bend test on carbon steel (P-No. 1) if the mechanical bend test fails. This does not agree with ASME Code Section IX, "Welding and Brazing Qualification," wherein if a welder fails the mechanical bend test, then his/her retest shall be by mechanical bend test. Also, paragraph 5.0 in this CC allows Charpy V-Notch testing of carbon steel (P-No. 1) materials in lieu of the bend tests required for Welding Procedure Qualifications. This paragraph also does not agree with ASME Code, Section IX.

Underwater welding can be a high hydrogen process. Radiography and Charpy V-Notch tests generally cannot identify hydrogen embrittlement of steel materials. However, a slow bend test could possibly identify this problem. To address both of these issues, the NRC staff requires the following additional conditions in the use of CC N-516-2:

1. Performance qualifications shall be in accordance with Paragraph 3.2 in CC N-516-2, except that immediate retest following a failed mechanical bend test shall be in accordance with ASME Code, Section IX, QW-320.
2. Procedure qualification shall be in accordance with Paragraph 3.1 in CC N-516-2. The Alternative Procedure Qualification Requirements of paragraph 5.0 shall not be used except as noted in Paragraph 4.(b)(4) for the additional requirements for qualification of filler metal.

These two conditions are necessary because the referenced paragraphs, i.e., paragraphs 3.2 and 5.0 in the CC, can eliminate the mechanical bend test requirements of ASME Code, Section IX. These bend tests are necessary because they can be helpful in recognizing whether the welds are prone to the harmful effects of hydrogen embrittlement and excessively hard weld deposits.

In the January 2, 2002, letter, the licensee stated the following limitation regarding use of the CC N-516-2:

When welding is to be performed on high neutron fluence Class 1 material, then a mockup, using material with similar fluence levels, should be welded to verify that adequate crack prevention measures were used.

The NRC staff concludes that, with the added conditions and limitation shown above, appropriate controls over the welding processes needed to implement such repairs, replacements, and modifications in a safe and effective manner are provided. Therefore, the NRC staff has determined that the use of CC N-516-2, as implemented by the licensee with the added conditions and limitation shown above for underwater welding, will adequately assure weld integrity.

### 3.0 CONCLUSION

Based on the discussion above, the NRC staff has concluded that the proposed alternative requested in RR-25 for the second 10-year interval, with the specified conditions and limitation, will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the proposed alternative for the second 10-year interval. CC N-516-2 has been reviewed and accepted with conditions in DG-1091 (proposed Revision 13 of RG 1.147). However, based on resolution of comments received on the proposed Revision 13 of RG 1.147, the conditions will be modified to include the 2 conditions identified above in the final Revision 13 of RG 1.147. Based on the above, the use of CC N-516-2 with the limitation specified by the licensee, and the two additional conditions is authorized until such time as the CC is published in a final revision 13 of RG 1.147. At that time, if the licensee intends to continue to implement CC N-516-2, the licensee is to follow all provisions in the CC including any limitations or conditions specified in Revision 13 to RG 1.147.

Principal Contributor: T. Bloomer

Date: February 21, 2002

Susquehanna Steam Electric Station,  
Units 1 &2

Bryan A. Snapp, Esq  
Assoc. General Counsel  
PPL Services Corporation  
2 North Ninth Street GENTW3  
Allentown, PA 18101-1179

Rocco R. Sgarro  
Supervisor-Nuclear Licensing  
PPL Susquehanna, LLC  
2 North Ninth Street GENA61  
Allentown, PA 18101-1179

Senior Resident Inspector  
U.S. Nuclear Regulatory Commission  
P.O. Box 35, NUCSA4  
Berwick, PA 18603-0035

Director-Bureau of Radiation Protection  
Pennsylvania Department of  
Environmental Protection  
P.O. Box 8469  
Harrisburg, PA 17105-8469

PPL Susquehanna, LLC  
Nuclear Records  
Attn: G. DallaPalu  
2 North Ninth Street GENA62  
Allentown, PA 18101-1179

Richard W. Osborne  
Allegheny Electric Cooperative, Inc.  
212 Locust Street  
P.O. Box 1266  
Harrisburg, PA 17108-1266

Regional Administrator, Region 1  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Bryce L. Shriver  
Vice President-Nuclear Site Operations  
Susquehanna Steam Electric Station  
PPL Susquehanna, LLC  
Box 467, NUCSA4  
Berwick, PA 18603-0035

Herbert D. Woodeshick  
Special Office of the President  
PPL Susquehanna, LLC  
Rural Route 1, Box 1797  
Berwick, PA 18603-0035

George T. Jones  
Vice President-Nuclear  
Engineering & Support  
PPL Susquehanna, LLC  
2 North Ninth Street, GENA61  
Allentown, PA 18101-1179

Dr. Judith Johnsrud  
National Energy Committee  
Sierra Club  
443 Orlando Avenue  
State College, PA 16803

Board of Supervisors  
Salem Township  
P.O. Box 405  
Berwick, PA 18603-0035

Allen M. Male  
Manager - Quality Assurance  
PPL Susquehanna, LLC  
Two North Ninth Street, GENA92  
Allentown, PA 18101-1179

Terry L. Harpster  
Manager - Nuclear Regulatory Affairs  
PPL Susquehanna, LLC  
Two North Ninth Street, GENA61  
Allentown, PA 18101-1179

Richard L. Anderson  
General Manager - SSES  
Susquehanna Steam Electric Station  
PPL Susquehanna, LLC  
Box 467, NUCSB3  
Berwick, PA 18603-0035

Ronald L. Ceravolo  
General Manager - Plant Support  
Susquehanna Steam Electric Station  
PPL Susquehanna Steam Electric Station  
Box 467, NUCSA4  
Berwick, PA 18603-0035