

February 14, 2002

Mr. Oliver D. Kingsley, President
Exelon Nuclear
Exelon Generation Company, LLC
200 Exelon Way, KSA 3-E
Kennett Square, PA 19348

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2, EVALUATION OF
RELIEF REQUEST RR-12, TABLE RR-12-7, RE: UNDERWATER WELDING
(TAC NOS. MB1018 AND MB1019)

Dear Mr. Kingsley:

By letter dated January 9, 2001, PECO Energy Company (PECO), the previous licensee, submitted proposed alternatives to the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a concerning the second 10-year inservice inspection programs. By letter dated June 27, 2001, Exelon Generation Company, LLC (EGC or the licensee), submitted an additional proposed relief request (RR-04) for the staff's review. PECO was succeeded by EGC as the licensed operator of Limerick Generating Station (LGS) on January 12, 2001. By letter dated January 30, 2001, EGC requested that the Nuclear Regulatory Commission's (NRC's) staff continue to process and disposition licensing actions previously docketed and requested by PECO.

This evaluation addresses request RR-12, Table RR-12-7. By letter dated May 15, 2001, the licensee provided additional information concerning the use of the proposed alternative, Code Case N-516-1, in response to the NRC's request dated May 4, 2001. By letter dated August 16, 2001, the licensee provided a revised version of the proposed relief requests, incorporating editorial changes that resulted from the acquisition of LGS by EGC. The content of the proposed relief requests and alternatives was not affected by the August 16, 2001, letter.

Subsections IWA-4000 and IWA-7000 of Section XI of the American Society of Mechanical Engineers (ASME) Code provide the general requirements for performing repairs and replacements. However, specific criteria on performing underwater welding are not addressed. The licensee proposed to allow the use of ASME Code Case N-516-1, "Underwater Welding," which allows for the repair or replacement of P-No. 1, P-No. 8 and P-No. 4X materials by use of underwater welding and establishes the requirements for this type of welding.

Based on the information provided, the NRC staff concludes that for RR-12, Table RR-12-7, the proposed alternative will provide an acceptable level of quality and safety. Therefore, the use of the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the second 10-year inservice inspection interval. The NRC staff's safety evaluation is enclosed.

Relief requests for RR-12, Tables RR-12-9 through RR-12-11, and for reliefs RR-24 through RR-31 were evaluated and approved in a letter to the licensee dated September 12, 2001. The staff will provide their evaluation of the remaining relief requests from the January 9 and June 27, 2001, letters under separate cover.

O. Kingsley

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If you have any questions, please contact your Project Manager, Christopher Gratton, at 301-415-1055.

Sincerely,

/RA by E G Adensam/

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

Docket Nos. 50-352 and 50-353

Enclosure: As stated

cc w/encl: See next page

O. Kingsley

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*SE provided, no major changes made

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST TO APPLY ASME CODE CASE N-516-1

UNDERWATER WELDING

LIMERICK GENERATING STATION, UNITS 1 AND 2

EXELON GENERATION COMPANY, LLC

DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated, January 9, 2001, as part of a submittal of proposed alternatives to the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, PECO Energy Company (PECO) submitted a request to use American Society of Mechanical Engineers (ASME) Code Case N-516-1, "Underwater Welding," for the Limerick Generating Station (LGS), Units 1 and 2. ASME Code Case N-516-1 allows for the repair or replacement of P-No. 1, P-No. 8 and P-No. 4X materials by use of underwater welding and establishes the requirements for this type of welding. In response to the staff's questions regarding Welding Procedure Qualifications and Welder Performance Qualifications, PECO, now Exelon Generation Company, LLC, (EGC), submitted a response to a Request for Additional Information (RAI) by letter dated May 15, 2001. The attachment to this response contains a revised version of ASME Code Case N-516-1 which addressed the staff's need for additional information. Pursuant to 10 CFR 50.55a(a)(3)(i), EGC is requesting to use ASME Code Case N-516-1, "Underwater Welding," for the repair or replacement of P-No. 1, P-No. 8 and P-No. 4X materials by use of underwater welding.

2.0 BACKGROUND

Subsections IWA-4000 and IWA-7000 of Section XI of the ASME Code provide the general requirements for performing repairs and replacements. However, specific criteria on performing underwater welding are not addressed. Pursuant to 10 CFR 50.55a(a)(3)(i), EGC proposed to implement the provisions of ASME Code, Section XI, Code Case N-516-1, "Underwater Welding," which is not approved by reference in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability--ASME Section XI, Division 1." ASME Code Case N-516-1 provides welding methods and requirements that may be used when welding for a repair or replacement activity is performed underwater. Authorization to utilize the guidance provided in Revision 1 of the subject Code Case will allow EGC to control the performance of underwater welding in accordance with an appropriate industry standard.

ENCLOSURE

In accordance with 10 CFR 50.55a(a)(3)(i), proposed alternatives to the regulations may be used when authorized by the Director of the Office of Nuclear Reactor Regulation, as long as the applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety.

The staff has reviewed and evaluated the licensee's request and supporting information on the proposed alternative to the ASME Code requirements for LGS Units 1 and 2, pursuant to the provisions of 10 CFR 50.55a(a)(3)(i).

3.0 EVALUATION

3.1 Basis for Relief

Subsections IWA-4000 and IWA-7000 of Section XI of the ASME Code do not address the requirements for welded repair or installation of replacement items by welding on ASME Class 1, 2 and 3, pressure boundary components when welding is performed underwater. ASME Code Case N-516, "Underwater Welding," was developed to provide welding methods and requirements for use when performing repair or replacement welding underwater. However, ASME Code Case N-516 is only applicable for use on P-No. 8 and P-No. 4X materials. ASME Code Case N-516 is endorsed in Revision 12 of Regulatory Guide 1.147. Revision 1 to ASME Code Case N-516 (ASME Code Case N-516-1) extends the applicability to underwater repairs and replacements made on components made of P-No. 1 carbon steel materials in addition to those materials already covered under ASME Code Case N-516. ASME Code Case N-516-1 was approved by the ASME Boiler and Pressure Vessel Code Committee on December 31, 1996, but was not endorsed in the most recent listing of Nuclear Regulatory Commission (NRC)-approved Code Cases provided in Revision 12 to Regulatory Guide 1.147. Authorization to utilize the guidance provided in ASME Code Case N-516-1 will allow EGC to control the performance of underwater welding in accordance with an appropriate industry standard.

EGC considers the requirements for underwater welding provided in ASME Code Case N-516-1 to be an improvement over existing requirements and as such will enhance the performance of repairs, replacements and modifications of the safety-related components in its nuclear facilities. 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. EGC, therefore, regards these requirements as providing an acceptable level of quality and safety.

3.2 NRC Staff Evaluation

The NRC staff reviewed the licensee's proposed alternative (ASME Code Case N-516-1) against the requirements of Section XI of the ASME Code. In a letter dated May 4, 2001, the NRC staff questioned how the licensee's proposed alternative met the requirements of the ASME Code regarding hydrogen embrittlement of the welds, the effect of high cooling rates on the welds, and the performance of mechanical bend tests.

The licensee responded to the NRC staff in a letter dated May 15, 2001, by proposing the following limitations on their use of ASME Code Case N-516-1:

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

The NRC staff reviewed the licensee's proposed alternative, including the aforementioned limitations, against the requirements of Section XI of the ASME Code.

The first limitation is necessary because weld repairs using conventional techniques in vessel components exposed to high neutron fluences may be unsuccessful because of helium-induced cracking and radiation damage in the material. Therefore, techniques to mitigate the deleterious effects of the helium contained in the highly irradiated materials during welding must be developed. The staff also found that the remaining two limitations are necessary because Paragraphs 3.2 and 5.0 from ASME Code Case N-516-1 could eliminate the mechanical bend test requirements of Section IX of the ASME Code. 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.

Based on staff review and evaluation of the licensee's proposed alternative and the response to the NRC staff's May 4, 2001, RAI, the staff concluded that, with the added limitations discussed above, appropriate controls over the welding processes that are needed to implement such repairs, replacements, and modifications in a safe and effective manner are provided.

4.0 CONCLUSION

The staff concludes that the licensee's proposed alternative to use ASME Code Case N-516-1, "Underwater Welding," with the added limitations shown in the licensee's May 15, 2001, RAI response, provides an acceptable level of quality and safety. Therefore, the staff authorizes the proposed alternative pursuant to 10 CFR 50.55a(a)(3)(i), for the second 10-year inservice inspection interval.

Principal Contributor: E. Andruszkiewicz

Date: February 14, 2002