February 25, 2005

Mr. Christopher M. Crane, President
and Chief Nuclear Officer
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BYRON STATION, UNIT 1 - REQUEST FOR RELIEF I2R-50 FROM THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE (CODE) (TAC NO. MC5046)

Dear Mr. Crane:

By letter dated November 5, 2004 (ML043150451), Exelon Generation Company, LLC (Exelon) submitted for approval, inservice inspection (ISI) relief request I2R-50 for the second 10-year ISI interval at Byron Station, Unit 1 (Byron 1). Exelon's request was for approval to use an alternate flaw depth sizing tolerance when performing ultrasonic examinations of dissimilier metal welds from the inside surface of piping. Specifically, Exelon requested relief from the 0.125 inch root mean square error (RMSE) sizing error in paragraph 3.2(b), "Sizing Acceptance Criteria," of ASME Code, Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Supplement 10, "Qualification Requirements for Dissimilar Metal Pipe Welds," as modified by ISI relief request authorized in NRC letter of July 16, 2003 (ML031970111).

The U. S. Nuclear Regulatory Commission staff reviewed Exelon's request and concludes that the proposal of adding the difference between the Code-required RMSE and the demonstrated accuracy to the measurements acquired from flaw sizing of the subject welds, in addition to the use of the acceptance standards specified in IWB-3500 of the Code, provides an acceptable level of quality and safety.

Therefore, Exelon's proposed alternative is authorized in accordance with 10 CFR 50.55a(a)(3)(I) for the remainder of the second 10-year ISI interval at Byron 1.

Sincerely,

/RA/

Gene Y. Suh, Chief, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. STN 50-454

Enclosure: Safety Evaluation

cc w/ encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO REQUEST FOR RELIEF I2R-5O

SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

BYRON STATION, UNIT 1

EXELON GENERATION COMPANY, LLC

DOCKET NUMBER STN 50-454

1.0 INTRODUCTION

By letter dated November 5, 2004 (ML043150451), Exelon Generation Company, LLC (the licensee) submitted for approval, inservice inspection (ISI) relief request I2R-50 for the second 10-year ISI interval at Byron Station, Unit 1 (Byron 1). The licensee's request was for approval to use an alternate flaw depth sizing tolerance when performing ultrasonic examinations of dissimiliar metal welds from the inside surface of piping. Specifically, the licensee requested relief from the 0.125 inch root mean square error (RMSE) sizing error in paragraph 3.2(b), "Sizing Acceptance Criteria," of ASME Code, Section XI, 1995 Edition, 1996 Addenda, Appendix VIII, Supplement 10, "Qualification Requirements for Dissimilar Metal Pipe Welds," as modified by ISI relief request authorized in NRC letter of July 16, 2003 (ML031970111).

2.0 REGULATORY EVALUATION

The inservice inspection of American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code) Class 1, Class 2, and Class 3 components is performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to Section 50.55a(g)(6)(I) of Title 10 of the *Code of Federal Regulations* (10 CFR). 10 CFR 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the 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) will 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The inservice inspection (ISI) Code of record for the second 10-year ISI interval at Byron 1 is the 1989 Edition. 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.

3.0 TECHNICAL EVALUATION

3.1 Components for Which Relief is Requested

Code Class 1 Pressure Retaining Dissimilar Metal Welds - Reactor Vessel Nozzle-to-Safe End Welds subject to examinations using procedures, personnel, and equipment qualified to the 1995 Edition with the 1996 Addenda fo the ASME Code, Section XI, Appendix VIII, Supplement 10, "Qualification Requirements for Dissimilar Metal Piping Welds" as identified below.

Nozzle-to-Safe End Welds

Description	Weld Number
RPV Nozzle to Safe End Hot Leg Loop C	1RC-01-R/RPVS-A/F1
RPV Nozzle to Safe End Cold Leg Loop C	1RC-01-R/RPVS-B/F1
RPV Nozzle to Safe End Hot Leg Loop D	1RC-01-R/RPVS-C/F1
RPV Nozzle to Safe End Cold Leg Loop D	1RC-01-R/RPVS-D/F1
RPV Nozzle to Safe End Hot Leg Loop A	1RC-01-R/RPVS-E/F1
RPV Nozzle to Safe End Cold Leg Loop A	1RC-01-R/RPVS-F/F1
RPV Nozzle to Safe End Hot Leg Loop B	1RC-01-R/RPVS-G/F1
RPV Nozzle to Safe End Cold Leg Loop B	1RC-01-R/RPVS-H/F1

3.2 Applicable Code Requirements

The current inservice inspection program is based on the ASME Code, Section XI, 1989 Edition with no Addenda. The ultrasonic examination of applicable Class 1 and 2 components is governed by Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," of the ASME Code, Section XI, 1995 Edition with the 1996 Addenda.

The 1995 Edition with the 1996 Addenda of the ASME Code, Section XI, Appendix VIII, Supplement 10, Paragraph 3.2(b), states that the examination procedures, equipment, and personnel are qualified for depth sizing when the root mean square error (RMSE) of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch RMSE.

3.3 Licensee's Proposed Alternative and Basis for Use (As Stated)

Pursuant to 10 CFR 50.55a(a)(3)(I), relief is requested for an alternative requirement that will provide an acceptable level of quality and safety. EGC requests relief to consider examination procedures, equipment, and personnel qualified for depth sizing when the RMSE of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.189 inch for the ultrasonic examination of dissimilar metal welds performed from the inside surface of the pipe at Byron Station, Unit 1. The RMSE of 0.189 inch is based on actual vendor demonstrated, in-process, field qualifications and is the optimum value that could be achieved.

The proposed procedure to address sizing of the flaws that may be detected during the examination is to add the difference between the 0.189-inch achieved sizing error and the 0.125-inch RMSE Appendix VIII, Supplement 10 acceptance criteria to the measured flaw size. EGC considers the use of this difference (0.064 inch) as an adjustment to the measured flaw will ensure a conservative bounding depth value for dissimilar metal welds at Byron Station, Unit 1.

3.4 NRC Staff's Evaluation

Supplement 10 of Appendix VIII to ASME Section XI requires that examination procedures, equipment, and personnel meet specific criteria for flaw depth sizing accuracy. The Code specifies that the maximum error of flaw depth measurements, as compared to the true flaw depths, must be less than or equal to 0.125 inch RMSE. The industry is in the process of qualifying personnel to Supplement 10 as implemented by the Performance Demonstration Initiative (PDI) program. However, for demonstrations performed from the inside surface of a pipe weldment, personnel have been unsuccessful at achieving the 0.125 inch RMSE depth sizing criterion. At this time, achieving the 0.125 inch RMSE appears to not be feasible. Personnel have only been capable of achieving an accuracy of 0.189 inch RMSE. The vendor contracted by the licensee has proposed to use 0.189 inch RMSE to size any detected flaws during the forthcoming outage (Spring 2005). The licensee would add the difference (0.064 inch) between the Code acceptance value (0.125 inch RMSE) and the demonstrated accuracy (0.189 inch RMSE) to the measurements acquired from flaw sizing. The use of this adjustment to flaw depth measurements will ensure a conservative bounding flaw depth value.

The staff finds that compliance with the Code-required RMSE value is currently not feasible and that by adding the difference between the Code-required RMSE and the demonstrated accuracy to the measurements acquired from flaw sizing, in addition to the to the use of the acceptance standards specified in IWB-3500 of the Code, provides an acceptable level of quality and safety.

4.0 CONCLUSIONS

Based on the above evaluation, the staff has determined that requiring the licensee to qualify procedures, personnel, and equipment to meet the maximum error of 0.125 inch RMSE for crack depth sizing is not feasible at the present time. The licensee's proposal of adding the difference between the Code-required RMSE and the demonstrated accuracy to the measurements acquired from flaw sizing of the subject welds, in addition to the to the use of the

acceptance standards specified in IWB-3500 of the Code, provides an acceptable level of quality and safety. Therefore, the licensee's alternative is authorized in accordance with 10 CFR 50.55a(a)(3)(I) for the remainder of the second 10-year ISI interval at Byron 1.

Principal contributor: A. Keim

Date: February 25, 2005