June 23, 2003

Mr. John L. Skolds, President
and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
200 Exelon Way, KSA 3-E
Kennett Square, PA 19348

SUBJECT: LIMERICK GENERATING STATION, UNITS 1 AND 2 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE - RELIEF FOR QUALIFICATION REQUIREMENTS FOR DISSIMILAR METAL PIPING WELDS (TAC NOS. MB6951 AND MB6952)

Dear Mr. Skolds:

By letter dated December 13, 2002, as supplemented by letters dated February 14, and March 6, 2003, Exelon Generation Company, LLC (Exelon or the licensee), submitted proposed alternatives to, and requested relief from, the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, concerning the second 10-year inservice inspection (ISI) programs for Limerick Generating Station, Units 1 and 2 (LGS-1 and 2).

Supplement 10 to Appendix VIII, “Performance Demonstration for Ultrasonic Examination Systems,” of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) contains the qualification requirements for procedures, equipment, and personnel involved with examining dissimilar metal welds using ultrasonic techniques. In lieu of these ASME Code requirements, Exelon requested to use the dissimilar metal weld criteria of the Electric Power Research Institute (EPRI)-Performance Demonstration Initiative (PDI) Program.

By letter dated February 14, 2003, Exelon incorporated a relief request and proposed using the EPRI-PDI Program with a depth sizing error of 0.155-inch root mean square (RMS) as the acceptance criterion in lieu of the ASME Code-required 0.125-inch RMS error.

As a result of its review of the licensee's submittal, the U.S. Nuclear Regulatory Commission (NRC) staff identified certain areas where additional information was needed from the licensee. By letter dated March 6, 2003, Exelon provided additional information concerning the use of the proposed alternative. Furthermore, Exelon withdrew its request for relief for the 0.155-inch RMS value for LGS-1 and requested that this relief be in effect for only 18 months for LGS-2.

Based on the information provided by the licensee, the NRC staff concludes that the proposed alternative will provide an acceptable level of quality and safety. Therefore, the use of the proposed alternative as described in the December 13, 2002, letter is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the remainder of the second 10-year ISI interval at each unit. Additionally, the NRC staff has determined that requiring the licensee to qualify personnel and equipment to meet the maximum error of 0.125-inch RMS for crack depth sizing is impractical. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for LGS-2 for a period of 18 months beginning March 6, 2003.

The NRC staff verbally authorized the proposed alternatives and granted the requested relief on March 14, 2003. The staff had completed its review and determined that the (proposed alternatives) and requested relief were acceptable, but had not yet formally documented its conclusions in a safety evaluation. The NRC staff's safety evaluation is enclosed.

If you need clarification of this approval, please contact the project manager, Mr. Scott P. Wall, at (301) 415-2855.

Sincerely,

/RA by REnnis 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: Safety Evaluation

cc w/encl: See next page

Based on the information provided by the licensee, the NRC staff concludes that the proposed alternative will provide an acceptable level of quality and safety. Therefore, the use of the proposed alternative as described in the December 13, 2002, letter is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the remainder of the second 10-year ISI interval at each unit. Additionally, the NRC staff has determined that requiring the licensee to qualify personnel and equipment to meet the maximum error of 0.125-inch RMS for crack depth sizing is impractical. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for LGS-2 for a period of 18 months beginning March 6, 2003.

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If you need clarification of this approval, please contact the project manager, Mr. Scott P. Wall, at (301) 415-2855.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PRESSURE RETAINING PIPING WELDS EXAMINATION

EXELON GENERATION COMPANY, LLC

LIMERICK GENERATING STATION, UNITS 1 AND 2

DOCKET NOS. 50-352 AND 50-353

1.0 INTRODUCTION

By letter dated December 13, 2002, as supplemented by letters dated February 14, and March 6, 2003, Exelon Generation Company, LLC (Exelon or the licensee), submitted proposed alternatives to, and requested relief from, the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, concerning the second 10-year inservice inspection (ISI) programs for Limerick Generating Station, Units 1 and 2 (LGS-1 and 2).

Supplement 10 to Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," of Section XI of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) contains the qualification requirements for procedures, equipment, and personnel involved with examining dissimilar metal welds using ultrasonic techniques. In lieu of these ASME Code requirements, Exelon requested to use the dissimilar metal weld criteria of the Electric Power Research Institute (EPRI)-Performance Demonstration Initiative (PDI) Program.

By letter dated February 14, 2003, Exelon incorporated a relief request and proposed using the EPRI-PDI Program with a depth sizing error of 0.155-inch root mean square (RMS) as the acceptance criterion in lieu of the ASME Code-required 0.125-inch RMS error. By letter dated March 6, 2003, Exelon provided its response to the U.S. Nuclear Regulatory Commission (NRC) staff's request for additional information concerning the use of the proposed alternative. Furthermore, Exelon withdrew its request for relief for the 0.155-inch RMS value for LGS-1 and requested that this relief be in effect for only 18 months for LGS-2.

2.0 REGULATORY EVALUATION

Section 50.55a(g) requires that ISI of the ASME Code, Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement 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 set forth in the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components 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. For LGS-1 and 2, the applicable edition of Section XI of the ASME Code for the second 10-year ISI interval is the 1989 Edition.

3.0 TECHNICAL EVALUATION

3.1 PDI Alternative to Supplement 10

3.1.1 Components for Which Relief is Requested

Dissimilar metal piping welds subject to ultrasonic examination using procedures, personnel, and equipment qualified to the 1995 Edition, 1996 Addenda, of the ASME Code, Section XI, Appendix VIII, Supplement 10, “Qualification Requirements for Dissimilar Metal Piping Welds.”

3.1.2 ASME Code Requirements (as stated by the licensee)

> The following paragraphs or statements are from ASME [Code] Section XI, Appendix VIII, Supplement 10, and identify the specific requirements that are included in this request for relief.
>
> Item 1 - Paragraph 1.1(b) states in part - Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent.
>
> Item 2 - Paragraph 1.1(d) states - All flaws in the specimen set shall be cracks.
>
> Item 3 - Paragraph 1.1(d)(1) states - At least 50% of the cracks shall be in austenitic material. At least 50% of the cracks in austenitic material shall be contained wholly in weld or buttering material. At least 10% of the cracks shall be in ferritic material. The remainder of the cracks may be in either austenitic or ferritic material.
>
> Item 4 - Paragraph 1.2(b) states in part - The number of unflawed grading units shall be at least twice the number of flawed grading units.
>
> Item 5 - Paragraph 1.2(c)(1) and 1.3(c) state in part - At least 1/3 of the flaws, rounded to the next higher whole number, shall have depths between 10% and 30% of the nominal pipe wall thickness. Paragraph 1.4(b) distribution table requires 20% of the flaws to have depths between 10% and 30%.
>
> Item 6 - Paragraph 2.0 first sentence states - The specimen inside surface and identification shall be concealed from the candidate.

Item 7 - Paragraph 2.2(b) states in part - The regions containing a flaw to be sized shall be identified to the candidate.

Item 8 - Paragraph 2.2(c) states in part - For a separate length sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate.

Item 9 - Paragraph 2.3(a) states - For the depth sizing test, 80% of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate.

Item 10 - Paragraph 2.3(b) states - For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.

Item 11 - Table VIII-S2-1 provides the false call criteria when the number of unflawed grading units is at least twice the number of flawed grading units.

3.1.3 Licensee's Proposed Alternative and Basis for Licensing Action Request

The licensee proposed the following alternatives to the ASME Code, Section XI, Appendix VIII, Supplement 10, requirements for LGS-1 and 2 during the remainder of the second 10-year ISI interval. The proposed alternatives, as stated by the licensee, will be implemented through the PDI program.

Item 1 - The proposed alternative to Paragraph 1.1(b) states:

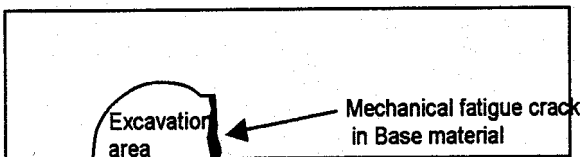
"The specimen set shall include the minimum and maximum pipe diameters and thicknesses for which the examination procedure is applicable. Pipe diameters within a range of 1/2 in. (13 mm) of the nominal diameter shall be considered equivalent. Pipe diameters larger than 24 in. (610 mm) shall be considered to be flat. When a range of thicknesses is to be examined, a thickness tolerance of ± 25% is acceptable."

Technical Basis - The change in the minimum pipe diameter tolerance from 0.9 times the diameter to the nominal diameter minus 0.5 inch provides tolerances more in line with industry practice. Though the alternative is less stringent for small pipe diameters, [these small pipes typically] have a thinner wall thickness than larger diameter piping. A thinner wall thickness results in shorter sound path distances that reduce the detrimental effects of the curvature. This change maintains consistency between Supplement 10 and the recent revision to Supplement 2.

Item 2 - The proposed alternative to Paragraph 1.1(d) states:

"At least 60% of the flaws shall be cracks, the remainder shall be alternative flaws. Specimens with [inter granular stress corrosion cracking] IGSCC shall be used when available. Alternative flaws, if used, shall provide crack-like reflective characteristics and shall be limited to the case where implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws. Alternative flaw mechanisms shall have a tip width of less than or equal to 0.002 in. (.05 mm)."

Technical Basis - As illustrated below, implanting a crack requires excavation of the base material on at least one side of the flaw. While this may be satisfactory for ferritic materials, it does not produce a useable axial flaw in austenitic materials because the sound beam, which normally passes only through base material, must now travel through weld material on at least one side, producing an unrealistic flaw response. In addition, it is important to preserve the dendritic structure present in field welds that would otherwise be destroyed by the implantation process. To resolve these issues, the proposed alternative allows the use of up to 40% fabricated flaws as an alternative flaw mechanism under controlled conditions. The fabricated flaws are isostatically compressed which produces ultrasonic reflective characteristics similar to tight cracks. Note, to avoid confusion the proposed alternative modifies instances of the term "cracks" or "cracking" to the term "flaws" because of the use of "alternative flaw mechanisms."



Item 3 - The proposed alternative to Paragraph 1.1 (d)(1) states:

"At least 80% of the flaws shall be contained wholly in weld or buttering material. At least one and a maximum of 10% of the flaws shall be in ferritic base material. At least one and a maximum of 10% of the flaws shall be in austenitic base material."

Technical Basis - Under the current [ASME] Code, as few as 25% of the flaws are contained in austenitic weld or buttering material. The metallurgical structure of austenitic weld material is ultrasonically more challenging than either ferritic or austenitic base material. The proposed alternative is therefore more challenging than the current [ASME] Code.

Item 4 - The proposed alternative to Paragraph 1.2(b) states:

"Detection sets shall be selected from Table VIII-S10-1. The number of unflawed grading units shall be at least one and a half times the number of flawed grading units."

Technical Basis - New Table VIII-S10-1 provides a statistically based ratio between the number of unflawed grading units and the number of flawed grading units. Based on information provided by the PDI, the proposed alternative reduces the ratio to 1.5 times to reduce the number of test samples to a more reasonable number. However, the statistical basis used for screening personnel and procedures is still maintained at the same level with competent personnel being successful and less skilled personnel being unsuccessful. The acceptance criteria for the statistical basis are in Table VIII-S10-1.

Item 5 - The proposed alternative to the flaw distribution requirements of Paragraph 1.2(c)(1) (detection) and 1.3(c) (length) is to use the Paragraph 1.4(b) (depth) distribution table (see below) for all qualifications.

Flaw Depth (% Wall Thickness)	Minimum Number of Flaws
10-30%	20%
31-60%	20%
61-100%	20%

Technical Basis - The proposed alternative uses the depth sizing distribution for both detection and depth sizing because it provides for a better distribution of flaw sizes within the test set. This distribution allows candidates to perform detection, length, and depth sizing demonstrations simultaneously utilizing the same test set. The requirement that at least 75% of the flaws shall be in the range of 10 to 60% of wall thickness provides an overall distribution tolerance yet the distribution uncertainty decreases the possibilities for testmanship that would be inherent to a uniform distribution. It must be noted that it is possible to achieve the same distribution utilizing the present requirements, but it is preferable to make the criteria consistent.

Item 6 - The proposed alternative to Paragraph 2.0 first sentence states:

"For qualifications from the outside surface, the specimen inside surface and identification shall be concealed from the candidate. When qualifications are performed from the inside surface, the flaw location and specimen identification shall be obscured to maintain a "blind test"."

Technical Basis - The current [ASME] Code requires that the inside surface be concealed from the candidate. This makes qualifications conducted from the inside of the pipe (e.g., [pressurized-water reactor] PWR nozzle to safe end welds) impractical. The proposed alternative differentiates between

[inner diameter] ID and [outer diameter] OD scanning surfaces, requires that they be conducted separately, and requires that flaws be concealed from the candidate.

Items 7 and 8 - The proposed alternatives to Paragraph 2.2(b) and 2.2(c) state:

"... containing a flaw to be sized may be identified to the candidate."

Technical Basis - The current [ASME] Code requires that the regions of each specimen containing a flaw to be length sized shall be identified to the candidate. The candidate shall determine the length of the flaw in each region (note that length and depth sizing use the term "regions" while detection uses the term "grading units"). To ensure security of the samples, the proposed alternative modifies the first "shall" to a "may" to allow the test administrator the option of not identifying specifically where a flaw is located.

Items 9 and 10 - The proposed alternative to Paragraph 2.3(a) and 2.3(b) state:

"... regions of each specimen containing a flaw to be sized may be identified to the candidate."

Technical Basis - The current [ASME] Code requires that a large number of flaws be sized at a specific location. The proposed alternative changes the "shall" to a "may" which modifies this from a specific area to a more generalized region to ensure security of samples.

Item 11 - The proposed alternative modifies the acceptance criteria of Table VIII-S2-1 as follows:

10

TABLE VIII-S2-1
PERFORMANCE DEMONSTRATION DETECTION TEST
ACCEPTANCE CRITERIA

Detection Test Acceptance Critera		False Call Test Acceptance Criteria	
No. of Flawed Grading Units	Minimum Detection Criteria	No. of Unflawed Grading Units	Maximum Number of False Calls
~~5~~	~~5~~	~~10~~	~~0~~
~~6~~	~~6~~	~~12~~	~~1~~
~~7~~	~~6~~	~~14~~	~~1~~
~~8~~	~~7~~	~~16~~	~~2~~
~~9~~	~~7~~	~~18~~	~~2~~
10	8	~~20~~ 15	~~3~~ 2
11	9	~~22~~ 17	~~3~~ 3
12	9	~~24~~ 18	~~3~~ 3
13	10	~~26~~ 20	~~4~~ 3
14	10	~~28~~ 21	~~5~~ 3
15	11	~~30~~ 23	~~5~~ 3
16	12	~~32~~ 24	~~6~~ 4
17	12	~~34~~ 26	~~6~~ 4
18	13	~~36~~ 27	~~7~~ 4
19	13	~~38~~ 29	~~7~~ 4
20	14	~~40~~ 30	~~8~~ 5

Technical Basis - The proposed alternative adds new Table VIII-S10-1 above. It is a modified version of Table VIII-S2-1 to reflect the reduced number of unflawed grading units and allowable false calls. As provided by the PDI, as a part of ongoing [ASME] Code activities, Pacific Northwest National Laboratory has reviewed the statistical significance to this new Table VIII-S10-1.

3.1.4 NRC Staff's Evaluation

The licensee proposed to use the program developed by PDI that is similar to the ASME Code requirements. The differences between the ASME Code and the PDI program are discussed below.

3.1.4.1 Item 1 - Paragraph 1.1(b)

The ASME Code requirement of "0.9 to 1.5 times the nominal diameter are equivalent" was established for a single nominal diameter. When applying the ASME Code-required tolerance to a range of diameters, the tolerance rapidly expands on the high side. Under current code requirements, a 5-inch OD pipe (4.5 nominal pipe size (NPS)) would be equivalent to a range of

4.5-inch to 7.5-inch nominal pipe diameter. Under the proposed PDI guidelines, the equivalent range would be reduced to 4.5-inch to 5.5-inch nominal diameter. With current ASME Code requirements, a 16-inch nominal diameter pipe (16-inch NPS) would be equivalent to a range of 14.4-inch to 24-inch. The proposed PDI guidelines would significantly reduce the equivalent range to 15.5-inch to 16.5-inch. The NRC staff considers the proposed alternative to be more conservative overall than current ASME Code requirements. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.2 Item 2 - Paragraph 1.1(d)

The ASME Code requires all flaws to be cracks. Manufacturing test specimens containing cracks free of spurious reflections and telltale indicators is extremely difficult in austenitic material. To overcome these difficulties, PDI developed a process for fabricating flaws that produce ultrasonic test (UT) acoustic responses similar to the responses associated with real cracks. PDI presented its process for discussion at public meetings held June 12 through 14, 2001, and January 31 through February 2, 2002, at the EPRI Nondestructive Examination Center, Charlotte, NC. The NRC staff attended these meetings and determined that the process parameters used for manufacturing fabricated flaws resulted in acceptable acoustic responses. PDI is selectively installing these fabricated flaws in specimen locations that are unsuitable for real cracks. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.3 Item 3 - Paragraph 1.1(d)(1)

The ASME code requires that at least 50% of the flaws be contained in austenitic material, and 50% of the flaws in the austenitic material shall be contained fully in weld or buttering material. This means that at least 25% of the total flaws must be located in the weld or buttering material. Field experience shows that flaws identified during ISI of dissimilar metal welds are more likely to be located in the weld or buttering material. The grain structure of austenitic weld and buttering material represents a much more stringent ultrasonic scenario than that of a ferritic material or austenitic base material. Flaws made in austenitic base material are difficult to create free of spurious reflectors and telltale indicators. The proposed alternative of 80% of the flaws in the weld metal or buttering material provides a challenging testing scenario reflective of field experience and minimizes testmanship associated with telltale reflectors common to placing flaws in austenitic base material. The NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.4 Item 4 - Paragraph 1.2(b) and Item 11 - Paragraph 3.1

The ASME Code requires that detection sets meet the requirements of Table VIII-S2-1 which specifies the minimum number of flaws in a test set to be 5 with 100% detection. The current ASME Code also requires the number of unflawed grading units to be two times the number of flawed grading units. The proposed alternative would follow the detection criteria of the table beginning with a minimum number of flaws in a test set being 10, and reducing the number of false calls to one and a half times the number of flawed grading units. The NRC staff has determined that the proposed alternative satisfies the pass/fail objective established for Appendix VIII performance demonstration. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.5 Item 5 - Paragraphs 1.2(c)(1) and 1.3(c)

For detection and length sizing, the ASME Code requires at least one third of the flaws be located between 10 and 30% through the wall thickness and one third located greater than 30% through the wall thickness. The remaining flaws would be located randomly throughout the wall thickness. The proposed alternative sets the distribution criteria for detection and length sizing to be the same as the depth sizing distribution, which stipulates that at least 20% of the flaws be located in each of the increments of 10-30%, 31-60% and 61-100%. The remaining 40% would be located randomly throughout the pipe thickness. With the exception of the 10-30% increment, the proposed alternative is a subset of current ASME Code requirements. The 10-30% increment would be in the subset if it contained at least 30% of the flaws. The change simplifies assembling test sets for detection and sizing qualifications and is more indicative of conditions in the field. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.6 Item 6 - Paragraph 2.0

The ASME Code requires the specimen inside surface be concealed from the candidate. This requirement is applicable for test specimens used for qualifications performed from the outside surface. With the expansion of Supplement 10 to include qualifications performed from the inside surface, the inside surface must be accessible while maintaining the specimen integrity. The proposed alternative requires that flaws and specimen identifications be obscured from candidates, thus maintaining blind test conditions. The NRC staff considers this to be consistent with the intent of ASME Code requirements. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.7 Items 7 and 8 - Paragraphs 2.2(b) and 2.2(c)

The ASME Code requires that the location of flaws added to the test set for length sizing shall be identified to the candidate. The proposed alternative is to make identifying the location of additional flaws an option. This option provides an additional element of difficulty to the testing process because the candidate would be expected to demonstrate the skill of detecting and sizing flaws over an area larger than a specific location. The NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.1.4.8 Items 9 and 10 - Paragraphs 2.3(a) and 2.3(b)

The ASME Code requires that 80% of the flaws be sized in a specific location that is identified to the candidate. The proposed alternative permits detection and depth sizing to be conducted separately or concurrently. In order to maintain a blind test, the location of flaws cannot be shared with the candidate. For depth sizing that is conducted separately, allowing the test administrator the option of not identifying flaw locations makes the testing process more challenging. The NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

The ASME Code also requires that the location of flaws added to the test set for depth sizing shall be identified to the candidate. The proposed alternative is to make identifying the location of additional flaws an option. This option provides an additional element of difficulty to the testing process because the candidate would be expected to demonstrate the skill of finding and sizing flaws in an area larger than a specific location. The NRC staff considers the proposed alternative to be more conservative than current ASME Code requirements. The NRC staff finds that the proposed alternative will provide an acceptable level of quality and safety and, therefore, is acceptable.

3.2 Relief from Maximum Error in RMS Value

3.2.1 Components for Which Relief is Requested

Dissimilar metal piping welds subject to ultrasonic examination using procedures, personnel, and equipment qualified to the 1995 Edition, 1996 Addenda, of the ASME Code, Section XI, Appendix VIII, Supplement 10, “Qualification Requirements for Dissimilar Metal Piping Welds.”

3.2.2 ASME Code Requirements

ASME Code, Section XI,1995 Edition, 1996 Addenda, Appendix VIII, Paragraph 3.2(b) of Supplement 10 states:

> “Examination procedures, equipment, and personnel are qualified for depth sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch.”

3.2.3 Licensee’s Proposed Alternative

The licensee proposed to use an RMS error value for flaw depth measurements of less than or equal to a 0.155-inch RMS in lieu of the 0.125-inch RMS value required by the AMSE Code and the PDI alternative to Supplement 10, as discussed in Section 3.1.3 above. This request applies only to LGS-2 for a duration of 18 months starting on March 6, 2003. To account for this difference, the licensee proposes, for purposes of flaw evaluation, to add the difference between the RMS error of a 0.155-inch RMS (i.e., value currently achieved by vendor) and the value required by the ASME Code (0.125-inch RMS) to the measured flaw depth to arrive at the flaw depth to be used in the analysis.

3.2.4 Basis for Licensing Action Request

Personnel qualifying to Supplement 10 procedures are currently not capable of qualifying to an overall error of less than or equal to a 0.125-inch RMS for crack depth sizing capability. Based on the performance of vendor automated procedure qualification results, an error of up to a 0.155-inch RMS should be considered during fracture mechanics calculations utilizing automated depth sizing measurements obtained with this procedure.

3.2.5 NRC Staff's Evaluation

Supplement 10 of Appendix VIII of Section XI of the ASME Code requires that examination procedures, equipment, and personnel meet specific criteria for flaw depth sizing accuracy. The ASME Code specifies that the maximum error of flaw depth measurements, as compared to the true flaw depths, must be less than or equal to a 0.125-inch RMS. The industry is in the process of qualifying personnel to Supplement 10; however, as of March 14, 2003, personnel had not been successful in achieving the 0.125-inch RMS criteria for depth sizing. Industry personnel had only been capable of achieving an accuracy of a 0.155-inch RMS. The NRC staff determined, therefore, that meeting ASME Code requirements was impractical. The licensee proposed that if a flaw is detected during the performance of a UT examination, the flaw will be sized using the depth sizing of a 0.155 inch-RMS value determined during the PDI performance demonstration. To take into account the increase in allowable depth sizing error, the licensee proposed to add the difference between the ASME Code-required 0.125-inch RMS error and the demonstrated 0.155-inch RMS error to measurements acquired from actual flaw sizing. Specifically, 0.030 inches will be added to the measured flaw size when performing fracture mechanics calculations. The NRC staff finds that adding 0.030 inches to the measured flaw size takes into account the increased uncertainty in flaw depth sizing error and, therefore, is appropriate for flaw evaluation.

4.0 CONCLUSION

4.1 PDI Alternative to Supplement 10

The NRC staff concludes that the licensee's proposed alternatives to Supplement 10, as administered by the EPRI-PDI Program, provides an acceptable level of quality and safety. Therefore, the use of the proposed alternatives as described in the licensee's letter dated December 13, 2002, is authorized for the remainder of the second 120-month ISI interval at LGS-1 and 2 pursuant to 10 CFR 50.55a(a)(3)(i).

4.2 Relief from Maximum Error in RMS Value

The NRC staff has determined that requiring the licensee to qualify personnel and equipment to meet the maximum error of a 0.125-inch RMS for crack depth sizing is impractical. The licensee's proposed program is otherwise in the public interest, having given due consideration to the burden upon the licensee that could result if the staff imposed the ASME Code requirements. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for LGS-2, for a period of 18 months beginning March 6, 2003.

All other ASME Code, Section XI, requirements for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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