

April 5, 2001

Mr. Mark Reddemann
Site Vice President
Kewaunee and Point Beach Nuclear Plants
Nuclear Management Company, LLC
6610 Nuclear Road
Two Rivers, WI 54241

SUBJECT: SAFETY EVALUATION FOR PROPOSED ALTERNATIVES TO ASME CODE, SECTION XI, INSERVICE INSPECTION PROGRAM RELATED TO STATISTICAL PARAMETERS FOR DEPTH SIZING AND TRAINING FOR ULTRASONIC TESTING PERSONNEL FOR THE POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 (TAC NOS. MB0203 AND MB0204)

Dear Mr. Reddemann:

By application dated August 21, 2000, Nuclear Management Company, LLC (NMC or the licensee), submitted Relief Requests RR-1-20, RR-1-21, RR-1-22, RR-2-26, RR-2-27, and RR-2-28 for the Inservice Inspection (ISI) Programs at Point Beach, Units 1 and 2. By letter dated November 30, 2000, NMC withdrew Relief Requests RR-1-21 and RR-2-27. By letter dated March 19, 2001, NMC supplemented Relief Requests RR-1-20 and RR-2-26. The result of the above correspondence is a request from NMC for approval of Relief Requests RR-1-20, RR-1-22, RR-2-26, and RR-2-28.

By Relief Requests RR-1-20 and RR-2-26, the licensee proposed to use a length sizing qualification criterion of 0.75-inch root mean square (RMS) in lieu of the requirement contained in 10 CFR 50.55a(b)(2)(xv)(C)(1) for use when applying Appendix VIII, Supplement 4, Subparagraph 3.2(b), of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (the Code). Also by Relief Requests RR-1-20 and RR-2-26, the licensee proposed to use the depth sizing requirement of 0.15-inch RMS consistent with 10 CFR 50.55a(b)(2)(xv)(C)(1) in lieu of the requirements contained in Appendix VIII, Supplement 4, Subparagraph 3.2(c), of the Code. By Relief Request RR-1-22 and RR-2-28, the licensee proposed to conduct annual ultrasonic testing training in accordance with 10 CFR 50.55a(b)(2)(xiv) requirements in lieu of Subarticle VII-4240 to Appendix VII of Section XI of the Code.

The Nuclear Regulatory Commission (NRC) staff has reviewed the alternatives proposed in Relief Requests RR-1-20, RR-1-22, RR-2-26, and RR-2-28. Based on the information provided in the relief requests, the NRC staff concludes that the portions of Relief Requests RR-1-20 and RR-2-26 to use the depth sizing requirement of 0.15-inch RMS consistent with 10 CFR 50.55a(b)(2)(xv)(C)(1) in lieu of the requirements contained in Appendix VIII, Supplement 4, Subparagraph 3.2(c), of the Code provide an acceptable level of quality and safety for the third ISI 10-year interval. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes these portions of the ISI program alternatives proposed in Relief Requests RR-1-20 and RR-2-26 for the third 10-year ISI interval.

In addition, the NRC staff concludes that the alternatives proposed in Relief Requests RR-1-22 and RR-2-28 also provide an acceptable level of quality and safety for the third ISI 10-year interval. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the ISI program alternatives proposed in Relief Requests RR-1-22 and RR-2-28 for the third 10-year ISI interval.

The need for the portions of RR-1-20 and RR-2-26 which propose to use a length sizing qualification criterion of 0.75-inch RMS arose from an error that was made in the wording of the rule. When the rule was issued, the staff mistakenly published the value of 0.15-inch RMS for depth sizing tolerance in place of the length sizing tolerance. The staff has corrected this error by revising 10 CFR 50.55a(b)(2)(xv)(C)(1). The revision was published in the *Federal Register* (66 FR 16390) and became effective on March 26, 2001. The new wording of 10 CFR 50.55a(b)(2)(xv)(C)(1) is as follows, "A depth sizing requirement of 0.15 inch RMS shall be used in lieu of the requirement in Subparagraph 3.2(a), and a length sizing requirement of 0.75 inch RMS shall be used in lieu of the requirement in Subparagraph 3.2(b)." The new wording eliminates the need for these portions of RR-1-20 and RR-2-26.

The NRC staff's safety evaluation (SE) is enclosed. If you have any questions regarding this issue or SE, please contact Beth Wetzel, the Senior Project Manager, at 301-415-1355.

Sincerely,

/RA/

Claudia M. Craig, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-266 and 50-301

Enclosure: Safety Evaluation

cc w/encl: See next page

In addition, the NRC staff concludes that the alternatives proposed in Relief Requests RR-1-22 and RR-2-28 also provide an acceptable level of quality and safety for the third ISI 10-year interval. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the ISI program alternatives proposed in Relief Requests RR-1-22 and RR-2-28 for the third 10-year ISI interval.

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Docket Nos. 50-266 and 50-301

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cc w/encl: See next page

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October 2000

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUEST FOR RELIEF NOS. RR-1-20, RR-1-22, RR 2-26, AND RR-2-28

NUCLEAR MANAGEMENT COMPANY, LLC

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-266 AND 50-301

1.0 INTRODUCTION

By application dated August 21, 2000, Nuclear Management Company, LLC (NMC or the licensee), submitted Relief Requests RR-1-20, RR-1-21, RR-1-22, RR-2-26, RR-2-27, and RR-2-28 for the Inservice Inspection (ISI) Programs at Point Beach Nuclear Plant, Units 1 and 2. By letter dated November 30, 2000, NMC withdrew Relief Requests RR-1-21 and RR-2-27. By letter dated March 19, 2001, NMC supplemented Relief Requests RR-1-20 and RR-2-26. The result of the above correspondence is a request from NMC for approval of Relief Requests RR-1-20, RR-1-22, RR-2-26, and RR-2-28.

The inservice inspection of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (the Code), Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable editions and addenda as required by 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). The regulation at 10 CFR 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 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, which was incorporated by reference in 10 CFR 50.55a(b) on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The inservice inspection Code of record for Point Beach, Units 1 and 2, for the third 10-year interval is the 1986 edition of the ASME Code. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code that were

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incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

Specifically, Relief Requests RR-1-20 and RR-2-26 proposed to use a length sizing qualification criterion of 0.75-inch root mean square (RMS) in lieu of the requirement contained in 10 CFR 50.55a(b)(2)(xv)(C)(1) for use when applying Appendix VIII, Supplement 4, Subparagraph 3.2(b), of the ASME Code. In addition, Relief Requests RR-1-20 and RR-2-26, proposed to use the depth sizing requirement of 0.15-inch RMS consistent with 10 CFR 50.55a(b)(2)(xv)(C)(1) in lieu of the requirements contained in Appendix VIII, Supplement 4, Subparagraph 3.2(c), of the Code. Relief Request RR-1-22 and RR-2-28 proposed to conduct annual ultrasonic testing training in accordance with 10 CFR 50.55a(b)(2)(xiv) requirements in lieu of Subarticle VII-4240 to Appendix VII of Section XI of the Code.

2.0 RELIEF REQUESTS RR-1-20 AND RR-2-26, UT LENGTH SIZING TOLERANCE FOR REACTOR PRESSURE VESSEL PERFORMANCE DEMONSTRATIONS

2.1 Code Requirements for which Relief is Requested

The regulation at 10 CFR 50.55a(g)(6)(ii)(C) imposes implementation of Appendix VIII to the 1995 edition with 1996 addenda of Section XI of the Code. The imposed implementation schedule for Supplement 4 to Appendix VIII is November 22, 2000. The Supplement 4, Subparagraph 3.2(b), length sizing qualification criterion requires that flaw lengths estimated by UT be the true length (-¼ inch +1 inch). However, 10 CFR 50.55a(b)(2)(xv)(C)(1) modifies the length sizing qualification criterion to a depth sizing acceptance criterion of 0.15-inch RMS and specifies that this be used in lieu of the requirements of Subparagraph 3.2(b).

Supplement 4, Subparagraph 3.2(c), requires that the UT performance demonstration results be plotted on a two-dimensional plot with the measured depth plotted along the ordinate axis and the true depth plotted along the abscissa axis. For qualification, the plot must satisfy the following statistical parameters: (1) slope of the linear regression line is not less than 0.7; (2) the mean deviation of flaw depth is less than 0.25 inches; and (3) correlation coefficient is not less than 0.70.

2.2 Licensee's Proposed Alternative to Code

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed using a length sizing qualification criterion of 0.75-inch RMS in lieu of the requirement contained in 10 CFR 50.55a(b)(2)(xv)(C)(1) for use when applying Appendix VIII, Supplement 4, Subparagraph 3.2(b). Also, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed using the 0.15-inch RMS value contained in 10 CFR 50.55a(b)(2)(xv)(C)(1), which modifies the depth sizing criterion of Appendix VIII, Supplement 4, Subparagraph 3.2(a), in lieu of Subparagraph 3.2(c).

2.3 Evaluation

The United States nuclear utilities created the Performance Demonstration Initiative (PDI) to implement performance demonstration requirements contained in Appendix VIII of Section XI of the Code. To this end, PDI has developed a performance demonstration program for qualifying UT equipment, procedures, and personnel. During the development of the performance

demonstration for Supplement 4, PDI determined that the Code criteria for flaw sizing was unworkable. The length sizing tolerance of $- \frac{1}{4}$ inch $+1.0$ inch in Supplement 4, Subparagraph 3.2(b), encouraged examiners to bias their results on the plus side. To discourage testmanship (passing the test based on manipulation of results rather than skill), PDI adopted a length sizing tolerance of 0.75-inch RMS, which has been in use since 1994. As early as 1995, the NRC staff has recognized and accepted PDI's use of 0.75-inch RMS for length sizing. PDI formalized their use of 0.75-inch RMS as the criterion for Supplement 4, Subparagraph 3.2(b), in Code Case N-622, "Ultrasonic Examination of RPV and Piping and Bolts and Stubs, Section XI, Division 1." The NRC representatives to ASME Code meetings participated in the process leading up to the publishing of Code Case N-622.

The NRC staff intended to formalize the acceptability of the 0.75-inch RMS length sizing criterion in 10 CFR 50.55a(b)(2)(xv)(C)(1), but mistakenly published the value of 0.15-inch RMS for depth sizing tolerance in place of the existing length sizing tolerance. The omission of the length sizing tolerance of 0.75-inch RMS in the rule was an oversight, and the inclusion of the depth sizing tolerance in Subparagraph 3.2(b) was an error. This error resulted in the need for the portions of RR-1-20 and RR-2-26 which propose to use a length size qualification criterion of 0.75-inch RMS in lieu of the requirement contained in 10 CFR 50.55a(b)(2)(xv)(C)(1) when applying Appendix VIII, Supplement 4, Subparagraph 3.2(b), of the Code. However, the staff has corrected this error by revising 10 CFR 50.55a(b)(2)(xv)(C)(1). The revision was published in the *Federal Register* (66 FR 16390), and became effective on March 26, 2001. The new wording of 10 CFR 50.55a(b)(2)(xv)(C)(1) is as follows, "A depth sizing requirement of 0.15 inch RMS shall be used in lieu of the requirement in Subparagraph 3.2(a), and a length sizing requirement of 0.75 inch RMS shall be used in lieu of the requirement in Subparagraph 3.2(b)." The new wording of the rule eliminates the need for these portions of RR-1-20 and RR-2-26.

In the second part of the alternative, the licensee proposed eliminating the use of Supplement 4, Subparagraph 3.2(c), which imposes three statistical parameters for depth sizing. The first parameter, 3.2(c)(1), pertains to the slope of a linear regression line. The linear regression line is the difference between actual versus true value plotted along a through-wall thickness. For Supplement 4 performance demonstrations, a linear regression line of the data is not applicable because the performance demonstrations are performed on test specimens with flaws located in the inner 15 percent through-wall. The differences between actual versus true value produce a tight grouping of results which resemble a shotgun pattern. The slope of a regression line from such data is extremely sensitive to small variations, thus, making the parameter of Subparagraph 3.2(c)(1) a poor and inappropriate acceptance criterion. The second parameter, 3.2(c)(2), pertains to the mean deviation of flaw depth. The value used in the code is too lax with respect to evaluating flaw depths within the inner 15 percent of wall thickness. Therefore, the licensee proposed to use the more appropriate criterion of 0.15-inch RMS of 10 CFR 50.55a(b)(2)(xv)(C)(1), which modifies Subparagraph 3.2(a) as the acceptance criterion. The third parameter, 3.2(c)(3), pertains to a correlation coefficient. The value of the correlation coefficient in Subparagraph 3.2(c)(3) is inappropriate for this application since it is based on the linear regression from Subparagraph 3.2(c)(1).

PDI was aware of the inappropriateness of Subparagraph 3.2(c) early in the development of their program. They brought the issue before the appropriate ASME committee which formalized eliminating the use of Supplement 4, Subparagraph 3.2(c), in Code Case N-622. NRC staff representatives participated in the discussions and consensus process of the code case. Based on the above, the NRC staff believes that the use of the Subparagraph 3.2(c)

requirements in this context is inappropriate and that the proposed alternative to use the RMS value of 10 CFR 50.55a(b)(2)(xv)(C)(1), which modifies the criterion of Appendix VIII, Supplement 4, Subparagraph 3.2(a), in lieu of Subparagraph 3.2(c) will provide an acceptable level of quality and safety.

2.4 Conclusion

Based on the discussion above, the NRC staff concludes that the portions of Relief Requests RR-1-20 and RR-2-26 which propose to use a length sizing qualification criterion of 0.75-inch RMS in lieu of the requirement contained in 10 CFR 50.55a(b)(2)(xv)(C)(1) when applying Appendix VIII, Supplement 4, Subparagraph 3.2(b), of the Code is no longer necessary.

Also, based on the discussion above, the NRC staff concludes that the portions of Relief Requests RR-1-20 and RR-2-26 to use the depth sizing requirement of 0.15-inch RMS consistent with 10 CFR 50.55a(b)(2)(xv)(C)(1) in lieu of the requirements contained in Appendix VIII, Supplement 4, Subparagraph 3.2(c), of the Code provide an acceptable level of quality and safety for the third ISI 10-year interval. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes these portions of the ISI program alternatives proposed in Relief Requests RR-1-20 and RR-2-26 for the third 10-year ISI interval.

3.0 RELIEF REQUESTS RR-1-22 AND RR-2-28, SUBARTICLE VII-4240, SUPPLEMENTAL TRAINING FOR UT PERSONNEL

3.1 Code Requirements for which Relief is Requested

The licensee is requesting relief from the 1995 edition with 1996 addenda, Appendix VII to Section XI of the Code, Subarticle VII-4240, related to supplemental training for qualified UT personnel. Subarticle VII-4240 requires a minimum of 10 hours of annual UT training.

3.2 Licensee's Proposed Alternative to Code

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed conducting annual UT training in accordance with 10 CFR 50.55a(b)(2)(xiv) requirements in lieu of Subarticle VII-4240 to Appendix VII of Section XI of the Code.

3.3 Evaluation

Subarticle VII-4240, Appendix VII of Section XI of the Code requires 10 hours of annual training to impart knowledge of new developments, material failure modes, and any pertinent technical topics as determined by the licensee. No hands-on training or practice is required to be included in the 10 hours of training. This training is required of all UT personnel qualified to perform examinations of ASME Code Class 1, 2, and 3 systems. Independent of the ASME Code, 10 CFR 50.55a(b)(2)(xiv) imposes the requirement that 8 hours of hands-on training with flawed specimens containing cracks be performed no earlier than 6 months prior to performing examinations at a licensee's facility. The licensee contends that implementation of the requirements contained in ASME Code, Section XI, and 10 CFR 50.55a(b)(2)(xiv) will result in redundant systems. The licensee further contends that the use of the 10 CFR 50.55a(b)(2)(xiv) requirements in lieu of the Code requirements will simplify record keeping, satisfy needs for maintaining skills, and provide an acceptable level of safety.

As part of the staff's rulemaking effort to revise 10 CFR 50.55a(b)(2), the issue of UT annual training requirements was reviewed. This review was included in the summary of comments to the rule published in the *Federal Register* (64 FR 51370). In the review, the staff determined that the "10 hours of annual training" requirement specified in the ASME Code was inadequate for two reasons. The first reason is that the training does not require practice with flawed specimens. Practice with flaws is necessary because signals can be difficult to interpret. The second reason is related to the length of training and its frequency. Studies have shown that an examiner's capability begins to diminish within 6 months if skills are not maintained. Therefore, examiners must practice on a frequent basis to maintain their capability for proper interpretation of flaws.

Based on resolution of public comments for the above rulemaking, the staff accepted an industry initiative advanced by the Electric Power Research Institute (EPRI), which proposed 8 hours of hands-on practice with flawed specimens containing cracks. The practice would occur no earlier than 6 months prior to performing examinations at a licensee's facility. The initiative was adopted in 10 CFR 50.55a(b)(2)(xiv) for personnel maintaining their Appendix VIII qualifications. The staff believes that the proposed alternative to use 10 CFR 50.55a(b)(2)(xiv) in lieu of Subarticle VII-4240 will maintain the skill and proficiency of UT personnel at or above the level provided in the Code for annual UT training, thereby providing an acceptable level of quality and safety.

3.4 Conclusion

Based on the discussion above, the staff concludes that the alternatives proposed in Relief Requests RR-1-22 and RR-2-28 for the third 10-year interval will provide an acceptable level of quality and safety for the third 10-year interval. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the proposed alternative for the third 10-year interval.

Principal Contributor: M. Shuaibi

Date: April 5, 2001