

May 16, 2007

Mr. Michael Balduzzi
Sr. Vice President, Regional Operations NE
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: PALISADES NUCLEAR PLANT - REQUEST FOR RELIEF, RR 4-12, USE OF
CODE CASE N-513-2 (TAC NO. MD2415)

Dear Mr. Balduzzi:

By a letter dated June 12, 2006, Nuclear Management Company, LLC (the licensee, at the time of the submittal), proposed to use the American Society of Mechanical Engineers (ASME) Code Case N-513-2, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping" to evaluate flaws in piping in lieu of the requirements of Subarticle IWA-4000 of the ASME *Boiler and Pressure Vessel Code*, Section XI. The transfer of ownership of Palisades Nuclear Plant from Consumers Energy Company (Consumers) to Entergy Nuclear Palisades occurred on April 11, 2007.

Based on our review of the submitted information, we conclude that the proposed alternative will provide an acceptable level of quality and safety because Code Case N-513-2 incorporates the conditions listed in Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability," Revision 14 imposed by the staff on the implementation of Code Case N-513-1. Pursuant to Title 10 of the *Code of the Federal Regulations* (10 CFR) Section 50.55a(a)(3)(i), the proposed alternative is authorized for the fourth 10-year interval as noted in the relief request.

Use of the Code Case is authorized until such time as the Code Case is published in a future version of RG 1.147, and incorporated by reference in 10 CFR 50.55a(b). At that time, if Entergy Nuclear Operations, Inc. intends to continue implementing this Code Case, it must follow all provisions of Code Case N-513-2 with conditions as specified in RG 1.147, and limitations as specified in Sections 50.55a(b)(4), (b)(5) and (b)(6), if any.

Sincerely,

/RA/

L. Raghavan, Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255
Enclosure:
Safety Evaluation
cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

USE OF CODE CASE N-513-2

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL RELIEF REQUEST NO. RR 4-12

PALISADES NUCLEAR PLANT

ENTERGY NUCLEAR OPERATIONS, INC.

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated June 12, 2006, Nuclear Management Company, LLC (NMC, the licensee, at the time of submittal) submitted request for relief (RR 4-12). In the request, the licensee proposed to use an alternative to certain requirements of the American Society of Mechanical Engineers (ASME) Code. Specifically, the licensee requested to use Code Case N-513-2, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping" in lieu of Subarticle IWA-4000 of the ASME Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." The relief proposed is sought for the fourth 10-year inservice inspection (ISI) interval of the Palisades Nuclear Plant (Palisades). The Palisades fourth 10-year ISI interval started on December 13, 2006.

2.0 REGULATORY EVALUATION

The ISI of the ASME Code Class 1, Class 2, and Class 3 components is to be performed in accordance with the ASME Code, Section XI, and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g). Pursuant to paragraph 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the Nuclear Regulatory Commission (NRC), if the applicant 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 paragraph 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, to the extent practical within the limitations of design, geometry, and materials of construction of the components. 10CFR 50.55a(g)(4)(i) requires that the ISI of components and system pressure tests conducted during the initial 10-year inspection interval comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10CFR 50.55a(b) on the date 12 months before the issuance of the operating license. The regulation at 10CFR 50.55a(g)(4)(ii) requires that the ISI during successive 10-year inspection intervals

comply with the requirements of the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10CFR 50.55a(b) 12 months before the start of the 120-month inspection interval, subject to the limitations and modifications listed therein.

3.0 TECHNICAL EVALUATION

3.1 ASME Code Component(s) Affected

ASME Section XI, Moderate Energy Class 2 and Class 3 Piping.

3.2 Applicable ASME, Section XI, Code Edition and Addenda

2001 Edition through the 2003 Addenda

3.3 Applicable ASME Code Requirements

The requirements of the 2001 Edition with the 2003 for Class 2 and Class 3 piping are as follows:

Class 2 Piping

IWC-3122 provides three ways in which an inservice volumetric and surface examinations may be accepted.

1. IWC-3122.1, "Acceptance by Examination"
2. IWC-3122.2, "Acceptance by Repair/Replacement Activity"
3. IWC-3122.3, "Acceptance by Analytical Evaluation"

IWC-3122.2 states, "A component whose examination detects flaws that exceed the acceptance standards of Table IWC-3410-1 is unacceptable for continued service until the additional examination requirements of IWC-2430 are satisfied and the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards of IWC-3000."

IWC-3132 provides four ways in which inservice visual examinations may be accepted.

1. IWC-3132, "Acceptance"
2. IWC-3132.1, "Acceptance by Supplemental Examination"
3. IWC-3132.2, "Acceptance by Corrective Measures or Repair/Replacement Activity"
4. IWC-3132.3, "Acceptance by Analytical Evaluation"

IWC-3132.2 states "A component containing relevant conditions is acceptable for continued service if the relevant conditions are corrected by a repair/replacement activity or by corrective measures to the extent necessary to meet the acceptance standards of Table IWC-3410-1."

Class 3 Piping

IWD-3120(a) states, "This Article is in course of preparation. The requirements of IWC-3120 may be used."

IWD-3120(b) states, "Components whose examination reveals flaws that do not meet the standards of IWD-3400 shall be subjected to supplemental examination, or to a repair/replacement activity."

IWD-3200 Supplemental Examinations states, "In the course of preparation. The requirements of IWC-3200 may be used."

IWD-3400 Standards states, "In the course of preparation. The requirements of IWC-3400 may be used."

3.4 Licensee's Basis for Proposed Alternative

The licensee stated that relief is requested from replacement or internal weld repair of wall thinning conditions resulting from various wall thinning degradation mechanisms such as erosion, corrosion, cavitation, and pitting in moderate energy Class 2 and 3 piping systems in accordance with the design specification and the original construction code.

The licensee stated that the NRC in Regulatory Guide (RG) 1.147, Revision 14, has accepted Code Case N-513-1 with the following limitations:

1. Specific safety factors in paragraph 4.0 must be satisfied.
2. Code Case N-513 may not be applied to:
 - (a) components other than pipe and tube
 - (b) leakage through a gasket
 - (c) threaded connections employing nonstructural seal welds for leakage prevention (through seal weld leakage is not a structural flaw; thread integrity must be maintained)
 - (d) degraded socket welds

Code Case N-513-1 permits flaws in Class 2 and 3 moderate-energy piping on a temporary basis until the next outage if it can be demonstrated that adequate pipe integrity and leakage containment are maintained. The Code Case currently applies to part-through and through-wall planar flaws and part-through nonplanar flaws. Service experience has shown that some piping can suffer degradation from nonplanar flaws, such as pitting and microbiological attack, where leakage can occur. The Code Case can be used for nonplanar through-wall flaws, but in a restrictive situation where nonplanar geometry is dominant in one plane.

According to the licensee, some plants have used the intent of Code Case N-513 for nonplanar leaking flaws. However, relief requests from code requirements are still required because of the limited scope of Code Case N-513. Code Case N-513-2 has expanded the application to cover all types of nonplanar flaws. The analysis procedures were expanded to address the general case of through-wall degradation. Code Case N-513-2 incorporates improved flaw evaluation procedures for piping that are provided in Appendix C to the 2002 Addenda of the ASME Code, Section XI. Code Case N-513-2 addresses the limitations posed in RG 1.147 as follows:

1. Paragraph 4.0 was revised to incorporate references to Appendix C for acceptance and eliminated the provision that lower safety factors may be used.

2. 1.0(a) was revised to limit the application of the code case as specified in the limitation applied in RG 1.147.

3.5 Duration of Proposed Alternative

The licensee requested approval of Code Case N-513-2 to be used for the fourth 10-year ISI interval at the Palisades.

3.6 NRC Staff Evaluation

As indicated in the above ASME Code, Section XI, requirements, flaws detected in Class 2 and 3 piping need to be either removed by repair/replacement, or accepted by analysis and acceptance criteria specified by of the ASME Code, Section XI. In the mid-1990's, the industry proposed temporary measures to accept and manage flaws in service for Class 3 piping. On August 14, 1997, the ASME issued the first version of Code Case N-513 which permitted temporary acceptance of flaws in moderate energy Class 3 piping without repair/replacement of degraded pipe during operation.

On March 28, 2001, the ASME issued Code Case N-513-1 which permits temporary acceptance of flaws for continued service in Class 2 and Class 3 piping without repair/replacement. Code Case N-513-1 also includes a revised flaw evaluation methodology. As stated in the licensee's basis above, the NRC staff has accepted Code Case N-513-1 in RG 1.47, Revision 14, with conditions. The NRC staff's conditions are related to safety factors and the scope of applicability of the code case.

On February 20, 2004, the ASME issued Code Case N-513-2 to address the NRC staff conditions imposed on Code Case N-513-1. The NRC staff has reviewed the proposed changes in Code Case N-513-2 and finds them to be acceptable. However, the NRC staff has not yet published the approval of Code Case N-513-2 in RG 1.147, Revision 14, or in 10 CFR 50.55a.

The NRC staff has reviewed changes between Code Case N-513-1 and Code Case N-513-2 and has confirmed that Code Case N-513-2 has incorporated the conditions imposed in RG 1.147, Revision 14. As discussed above, Code Case N-513-2 has incorporated the flaw evaluation procedures for piping that are specified in Appendix C to the 2002 Addenda of the ASME Code, Section XI. The NRC staff has approved the 2002 Addenda of the ASME Code in 10 CFR 50.55a. Therefore, the use of the flaw evaluation methodology in Appendix C to the 2002 Addenda is acceptable.

Although some flaws are allowed to remain in service, Code Case N-513-2 provides requirements to assure piping integrity. Code Case N-513-2 requires frequent inspections of no longer than 30-day intervals to determine if the flaw is growing and to establish the time at which the flaw will reach the allowable size. Alternatively, a flaw growth evaluation may be performed to predict the time at which the detected flaw will grow to the allowable size. When a flaw growth analysis is used to establish the allowable time for temporary operation, periodic examinations of no more than 90 day intervals shall be conducted to verify the flaw growth analysis predictions. If the inspections show that the flaw growth rate to be unacceptable, the Code Case requires repair or replacement when the predicted flaw size exceeds the acceptance criteria or the next scheduled outage, whichever occurs first.

For through-wall leaking flaws, the code case requires daily walkdowns to confirm that the analysis conditions in the evaluation remain valid. In addition, the Code Case requires augmented volumetric examination or physical measurement to assess degradation of the affected system. The Code Case requires expansion in the inspection scope by increasing the sample size when additional flaws are found. Code Case N-513-2 also provides a rigorous methodology and acceptance criteria to evaluate the flaw. The licensee is committed to adhere to all of the requirements in Code Case N-513-2.

Further, the NRC staff notes that although the degraded pipe is permitted to operate per Code Case N-513-2, the degraded piping is required to be repaired or replaced during the subsequent refueling outage in accordance with the appropriate requirements of Section XI of the ASME Code.

On the basis of the above evaluation, the NRC staff finds that in lieu of ASME Code, Section XI, IWA-4000, the proposed alternative requirements of Code Case N-513-2 provide an acceptable level of quality and safety.

4.0 CONCLUSION

The NRC staff concludes that use of ASME Code, Section XI, Code Case N-513-2, as discussed in the request for relief will provide an acceptable level of quality and safety. Code Case N-513-2 contains requirements to maintain piping structural integrity, and incorporates the conditions listed in RG 1.147, Revision 14. Therefore, use of the Code Case is authorized until such time as the Code Case is published in a future version of RG 1.147, and incorporated by reference in 10 CFR 50.55a(b). At that time, if Entergy Nuclear Operations, Inc. intends to continue implementing this Code Case, it must follow all provisions of Code Case N-513-2 with conditions as specified in RG 1.147, and limitations as specified in Sections 50.55a(b)(4), (b)(5), and (b)(6), if any.

Pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for the performance of piping evaluations to determine whether temporary continued operation of applicable ASME Code Class 2 and 3 piping systems is allowed. This authorization applies to Palisades for the remainder of the fourth 10-year ISI interval of Palisades as noted in the relief request.

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

Principal Contributor: Keith M. Hoffman

Date: May 16, 2007