



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 6, 2012

Mr. Steven D. Capps  
Vice President  
McGuire Nuclear Station  
Duke Energy Carolinas, LLC  
12700 Hagers Ferry Road  
Huntersville, NC 28078

SUBJECT: MCGUIRE NUCLEAR STATION, UNIT 2, RELIEF 10-MN-002 TO EXTEND THE  
INSERVICE INSPECTION INTERVAL FOR REACTOR VESSEL CATEGORY  
B-A AND B-D WELDS (TAC NOS. ME7329 AND ME7330)

Dear Mr. Capps:

By letter dated October 3, 2011, as supplemented by letter dated March 29, 2012, Duke Energy Carolinas, LLC (the licensee) submitted a request, RR 11-MN-002, to the Nuclear Regulatory Commission (NRC) for the use of an alternative to the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, for specified ASME Code Class 1, Examination Category B-A and B-D reactor vessel (RV) welds at McGuire Nuclear Station, Unit 2 (McGuire 2).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(i), the licensee requested the use of a proposed alternative to extend the third 10-year ISI interval for ASME Code Class 1, category B-A and B-D, RV welds for McGuire 2 specified in RR 11-MN-002 on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the proposed alternative would provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the licensee's proposed alternative for the third 10-year ISI interval at McGuire 2.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including the third party review by the Authorized Nuclear In-service Inspector.

S. Capps

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If you have any questions, please contact the Project Manager, Jon H. Thompson at 301-415-1119 or via e-mail at [jon.thompson@nrc.gov](mailto:jon.thompson@nrc.gov).

Sincerely,



Robert J. Pascarelli, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-370

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via ListServ



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST NO. 11-MN-002 REGARDING THE EXTENSION OF THE THIRD 10-YEAR

INSERVICE INSPECTION INTERVAL FOR REACTOR VESSEL CATEGORY B-A AND B-D

DUKE ENERGY CAROLINAS, LLC

MCGUIRE NUCLEAR STATION, UNIT 2

DOCKET NO. 50-370

1.0 INTRODUCTION

By letter dated October 3, 2011, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11285A438) as supplemented by letter dated March 29, 2012, (ADAMS Accession No. ML12102A014) Duke Energy Carolinas, (the licensee) submitted relief request (RR) 11-MN-002 for the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff's review and approval. The licensee requested the use of an alternative to inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code), Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components."

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(i), the licensee requested the use of a proposed alternative to extend the third 10-year ISI interval for specified ASME Code Class 1, Examination Category B-A and B-D reactor vessel (RV) welds at McGuire Nuclear Station, Unit 2 (McGuire 2) on the basis that the alternative provides an acceptable level of quality and safety. RR 11-MN-002 is requested for the remainder of the McGuire 2, third 10-year ISI interval. The applicable Code of record for the third 10-year interval ISI program at McGuire 2 is the 1998 Edition of the ASME Code, Section XI, with 2000 Addenda. The end date for the third 10-year interval ISI program at McGuire 2 is July 15, 2014.

2.0 REGULATORY EVALUATION

For ASME Code Class 1, 2, and 3 components, ISI is performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). The regulation at 10 CFR 50.55a(a)(3) states that "Proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) ... may be used when

Enclosure

authorized by the Director, Office of Nuclear Reactor Regulation, or Director, Office of New Reactors, as appropriate. Any proposed alternatives must be submitted and authorized prior to implementation. The applicant or licensee shall demonstrate that: (i) The proposed alternatives would provide an acceptable level of quality and safety; or (ii) Compliance with the specified requirements of this section 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) “Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) which are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of editions and addenda of the ASME B&PV Code ... to the extent practical within the limitations of design, geometry and materials of construction of the components.”

The regulation at 10 CFR 50.55a(g)(4)(i) also requires that “Inservice examinations of components and system pressure tests conducted during the initial 120-month inspection interval must comply with the requirements in the latest edition and addenda of the Code incorporated by reference in paragraph (b) of this section on the date 12 months before the date of issuance of the operating license under this part, or 12 months before the date scheduled for initial loading of fuel under a combined license under part 52 of this chapter (or the optional ASME Code cases listed in NRC Regulatory Guide 1.147, Rev. 16, when using Section XI; or Regulatory Guide 1.192 when using the OM Code, that are incorporated by reference in paragraph (b) of this section), subject to the conditions listed in paragraph (b) of this section.”

### 3.0 BACKGROUND

#### 3.1 WCAP-16168-NP

By letter dated May 8, 2008 (ADAMS Package No. ML081060053), the NRC staff issued a final safety evaluation (SE) that found that Topical Report WCAP-16168-NP, “Risk-Informed Extension of the Reactor Vessel In-Service Inspection Interval,” Rev. 2 (the WCAP), is acceptable for referencing in licensing applications for pressurized water reactors designed by Westinghouse Electric Company (Westinghouse), Combustion Engineering, Inc. (Combustion Engineering), and Babcock and Wilcox, Inc. (Babcock and Wilcox). The WCAP was developed to support a risk-informed assessment of extensions to the ISI intervals for ASME Code, Section XI, Examination Category B-A and B-D components from 10 to 20 years using data from three different PWR plants (referred to as the pilot plants) representing each of the vendors.

The analyses in the WCAP used probabilistic fracture mechanics tools and inputs from the work described in the NRC staff’s pressurized thermal shock (PTS) risk re-evaluation described in NUREG-1874, “Recommended Screening Limits for Pressurize Thermal Shock (PTS),” March 1, 2007 (ADAMS Accession No. ML070860156). The PWR Owners Group analyses incorporated the effects of fatigue crack growth and ISI data. Design basis transient data was used as an input for the fatigue crack growth evaluation. The effects of ISI data were modeled consistently with the previously-approved probabilistic fracture mechanics codes. These effects were inputs into the evaluations performed with the “Fracture Analysis of Vessels - Oak Ridge” (FAVOR) code. All other inputs were identical to those used in the PTS risk re-evaluation.

The PWR Owners Group concluded, as a result of these studies, that the ASME Code, Section XI, 10-year ISI interval for Examination Category B-A and B-D components in PWR RVs can be safely extended from 10 to 20 years. This conclusion, based on the results from the pilot plant analyses, was considered to apply to any plant designed by the three PWR vendors represented in the pilot plant study, as long as certain critical plant-specific criteria (defined in Appendix A of the WCAP and the NRC staff SE for the WCAP) are bounded by the analysis for the applicable pilot plant.

### 3.2 NRC Staff Evaluation of WCAP-16168-NP

In its final SE for Rev. 2 of the WCAP, the NRC staff concluded that the methodology used in the WCAP is consistent with the guidance provided in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Rev. 1 (ADAMS Accession No. ML023240437). The NRC staff also concluded that the methodology of the WCAP is acceptable for referencing as a risk-informed basis for individual PWR licensees in requests submitted under 10 CFR 50.55a to implement alternatives to the ASME Code, Section XI, requirements for extending the ISI intervals for Examination Category B-A and B-D components, provided that licensees meet the limitations and conditions specified in the SE. The final approved version of the WCAP, incorporating the NRC staff's final SE, was issued on June 13, 2008 (ADAMS Accession No. ML082820046) as WCAP-16168-NP-A, Rev. 2.

In order to obtain authorization for alternatives to ASME Code, Section XI, requirements to allow extension of the ISI interval for Examination Category B-A and B-D components, individual PWR licensees must demonstrate that their plants are bounded by the pilot plant analyses in the WCAP. The criteria approved by the NRC staff for demonstrating that this pilot plant analysis is bounding on a plant-specific basis are summarized as follows:

1. In its request for an alternative, the licensee shall identify the year during which future inspections of the Examination Category B-A and B-D welds will be performed. The future inspection dates for the proposed extended ISI interval should be within plus or minus one refueling cycle of the date specified by the "Plan for Plant-Specific Implementation of Extended Inservice Inspection Interval per WCAP-16168-NP, Rev. 1, "Risk-Informed Extension of the Reactor Vessel In-Service Inspection Interval," MUHP 5097-99, Task 2059," sent by letter dated October 31, 2006 (ADAMS Accession No. ML082210245). Any deviations from the implementation plan should be discussed in detail in the request for an alternative ISI interval. The maximum allowable ISI interval for plants requesting these extensions is 20 years.
2. In its request for an alternative, the licensee must report the number of past inspections of the Examination Category B-A and B-D RV welds, the results of the prior ISI of the RV welds, and the methodology used for performing these inspections.
3. The licensee must demonstrate in its request that the embrittlement of their RV is within the envelope used in the supporting analyses for the WCAP. The licensees must provide the 95th percentile total through-wall cracking frequency for the RV ( $TWCF_{TOTAL}$ ) and its supporting material properties for the end of the licensed operating period in order to extend the inspection interval from 10 to 20 years. The 95th percentile

TWCF<sub>TOTAL</sub> must be calculated using the methodology in NUREG-1874. The supporting material properties are the maximum nil-ductility reference temperature (RT<sub>MAX-X</sub>) and the shift in the Charpy V-notch test transition temperature produced by irradiation defined at the 30 ft-lb energy level ( $\Delta T_{30}$ ). The RT<sub>MAX-X</sub> and  $\Delta T_{30}$  values must be calculated using the latest approved methodology documented in RG 1.99, "Radiation Embrittlement of Reactor Vessel Materials," Rev. 2 (ADAMS Accession No. ML003740284), or other NRC staff-approved methodology for the limiting axial weld, circumferential weld, plate and forging in the RV beltline region. The request for an alternative ISI interval must demonstrate that the 95th percentile TWCF<sub>TOTAL</sub> value for the RV at the subject plant is bounded by the corresponding value for the pilot plant analysis from the WCAP. This analysis should address all materials in the beltline region of the RV for the subject plant, with at least three surveillance data points.

4. If the subject plant is a Babcock and Wilcox plant:
  - a. The licensee must verify that the WCAP pilot plant basis fatigue crack growth for 12 heat-up/cool-down transients per year bound the fatigue crack growth for all of the subject plant's design basis transients.
  - b. The licensee must identify the design basis transients that contribute to significant fatigue crack growth.
5. If the subject plant has RV forgings that are susceptible to underclad cracking and if the RV has forgings with RT<sub>MAX\_FO</sub> values exceeding 240°F, then the WCAP analyses are not applicable, and the licensee must submit a plant-specific evaluation for any extension to the 10-year ISI interval for the ASME Code, Section XI, Examination Category B-A and B-D RV welds.

#### 4.0 TECHNICAL EVALUATION

##### 4.1 ASME Code Components

RR 11-MN-002 addresses the following ASME Code, Section XI, Examination Categories and Item Numbers covering examinations of ASME Code Class 1 components (the subject RV weld components) for the third 10-year interval ISI program at McGuire 2. The following examination categories and item numbers are from Table IWB-2500-1 of the 1998 Edition and 2000 Addenda of the ASME Code, Section XI.

ASME Code Class	Examination Category	Item Number(s)	Component Description
1	B-A	B1.11 B1.21 B1.22 B1.30	Circumferential Shell Welds Circumferential Head Welds Meridional Head Welds Shell-to-Flange Weld
1	B-D	B3.90 B3.100	RV Nozzle-to-Vessel Welds RV Nozzle Inside Radius Section

## 4.2 Licensee Evaluation

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee submitted RR 11-MN-002, in order to obtain authorization for an alternative to the ISI requirements of the ASME Code, Section XI, for the Examination Category B-A RV welds and Examination Category B-D nozzle-to-RV welds at McGuire 2 (the subject RV welds). The ASME Code, Section XI, requires volumetric examinations of these welds during each 10-year ISI interval. The ASME Code, Section XI, IWB-2412, states that for plants inspected under Inspection Program B, the required examinations of each Examination Category in Table IWB-2500-1 shall be completed during each 10-year ISI interval. The scheduled end date for the third 10-year interval ISI program at McGuire 2 is July 15, 2014.

The licensee requested an alternative to the IWB-2412, Inspection Program B, requirement that volumetric examinations of essentially 100% of the Examination Category B-A and B-D welds be performed once each 10-year inspection interval. The licensee requested an extension of the third 10-year ISI interval for the subject Examination Category B-A and B-D RV welds from 10 to 20 years, which would allow for the deferral of the subject examinations until July 15, 2024, plus or minus one year. The licensee stated that an extension of the ISI interval to 20 years will result in a reduction in radiation exposure. The licensee stated that the ISI interval extension for the subject RV welds is requested on the basis that deferring the subject examinations will result in a negligible change in risk by satisfying the risk-informed criteria specified in RG 1.174.

The licensee stated that the methodology used to demonstrate the acceptability of extending the inspection interval for Examination Category B-A and B-D RV welds based on a negligible change in risk is contained in Rev. 2 of the WCAP. This methodology was used to develop a pilot plant analysis for Westinghouse, Combustion Engineering, and Babcock and Wilcox RV designs and is an extension of the work that was performed for the development of the alternate PTS Rule, 10 CFR 50.61a. The WCAP criteria for demonstrating that this pilot plant analysis is applicable on a plant-specific basis were identified by the licensee in Tables 1 and 2 of its submittal for RR 11-MN-002. The licensee stated that by demonstrating that McGuire 2 is bounded by the Westinghouse pilot plant analysis from the WCAP with respect to these criteria, the application of the WCAP methods to McGuire 2 is acceptable for use as a risk-informed basis for extending the ISI interval for the subject RV welds.

The licensee provided information for demonstrating that McGuire 2 is bounded by the Westinghouse pilot plant analysis from the WCAP, relative to the criteria identified above in Section 3.2 of this SE. Information pertaining to previous inspections of the subject RV welds, as well as the proposed schedule for future inspections of the subject RV welds, was provided in Table 2 of RR 11-MN-002. The licensee provided details concerning the 95th percentile  $TWCF_{TOTAL}$  calculations for the McGuire 2 RV in Table 3 of RR 11-MN-002. Table 3 of RR 11-MN-002 includes information necessary to demonstrate whether the embrittlement of the McGuire 2 RV is within the envelope used in the Westinghouse pilot plant analysis from the WCAP.

### 4.3 NRC Staff Evaluation

The NRC staff reviewed the information provided in RR 11-MN-002 to determine whether the licensee had adequately demonstrated that the risk-informed criteria of the WCAP are applicable on a plant-specific basis to McGuire 2 (a Westinghouse plant). This determination was made by verifying that the licensee had demonstrated that McGuire 2 is bounded by the Westinghouse pilot plant analysis from the WCAP with respect to the five criteria discussed above in Section 2.3 of this SE. By demonstrating that McGuire 2 is bounded by the Westinghouse pilot plant analysis from the WCAP, with respect to these five criteria, the licensee would have a sufficient technical basis for applying the risk-informed provisions of the WCAP to the McGuire 2 RV, and the Examination Category B-A and B-D RV weld examinations (the subject examinations) could be deferred, in accordance with the provisions of the WCAP and the implementation plan dated October 31, 2006.

For the first criterion specified for plant-specific application of the WCAP methodologies, the NRC staff reviewed the licensee's submittal to determine whether the deferred examination dates for the RV welds identified in RR 11-MN-002 were within plus or minus one refueling cycle of the dates identified in the WCAP implementation plan, or whether any deviations from the implementation plan were clearly discussed in the submittal. In its submittal, the licensee stated that the subject RV weld examinations for the third 10-year interval ISI program are currently scheduled to occur during the 2014 refueling outage at McGuire 2, in accordance with ASME Code, Section XI requirements. The WCAP's implementation plan states that if the licensee for McGuire 2 receives NRC authorization for an alternative to defer the subject RV weld examinations per the criteria of the WCAP, then the subject RV weld examination will be deferred until the 2024 refueling outage. The NRC staff verified that Table 2 of RR 11-MN-002 identifies that the future examinations of the subject welds will be deferred until 2024, consistent with the WCAP implementation plan. Therefore, the NRC staff found that the licensee satisfied the first criterion for plant-specific application of the WCAP methodologies.

For the second criterion specified for plant-specific application of the WCAP methodologies, the NRC staff reviewed the licensee's submittal to determine whether the licensee adequately reported the number of past inspections of the RV welds, the results of the previous ISI for the RV welds, and the methodology used for performing these inspections. The NRC staff also reviewed the licensee's submittal to determine whether any recordable indications discovered in the RV beltline region during the previous ISI are bounded by the limits set in 10 CFR 50.61a. The licensee provided information concerning the inspection methodology, the number of past inspections, and the results of the previous ISI for the McGuire 2 RV in Table 2 of RR 11-MN-002.

The licensee stated that two previous ISI examinations of Examination Category B-A and B-D RV welds have been performed to date. The licensee stated in Table 2 of RR 11-MN-002 that the most recent volumetric examination of the subject welds for the second 10-year interval ISI program was performed using the performance demonstration requirements of the ASME Code, Section XI, Appendix VIII, and future volumetric inspections will be performed in accordance with these same requirements. The licensee also stated that during the most recent ISI, ASME Code Case (CC) N-648-1, "Alternative Requirements for Inner Radius Examinations of Class 1 Reactor Vessel Nozzles, Section XI, Division 1," was invoked as an alternative to the ASME Code, Section XI requirements. ASME CC N-648-1 permits a visual examination in lieu of a

volumetric examination of the Examination Category B-D, Item No. B3.100, RV nozzle inside radius section. The NRC staff noted that ASME CC N-648-1 is listed as "Conditionally Acceptable" in Table 2 of RG 1.147, "Inservice Inspection Code Case Acceptability, ASME [Code], Section XI, Division 1," Rev. 16, dated October 2010, (ADAMS Accession No. ML101800536), with a condition stating that the visual examination should use enhanced magnification that has a resolution sensitivity to detect a 1 mil width wire or crack. By letter dated March 29, 2012 (ADAMS Accession No. ML12102A014), the licensee responded to NRC staff RAI questions, by stating that the visual examination methods of ASME CC N-648-1 met the condition specified in Table 2 of RG 1.147, Rev. 16. Accordingly, the NRC staff found use of this CC acceptable.

In Table 2 of RR 11-MN-002, the licensee stated that three recordable indications were detected in the RV beltline region during volumetric examinations conducted for the second 10-year interval ISI program at McGuire 2. All indications were screened using the ASME Code, Section XI, IWB-3500, acceptance standards, and all were found to be acceptable for continued service in accordance with the Table IWB-3510-1 acceptance criteria. According to the licensee, none of these indications are located in the inner one inch of the RV wall thickness from the clad-to-base metal interface. The regulation at 10 CFR 50.61a does not specify an upper limit to the number of allowable indications if the indications are bounded by the Table IWB-3510-1 acceptance criteria and if the indications are not in the inner one inch of the RV wall thickness. Accordingly, the licensee determined that the lack of any indications in the inner one inch of the RV beltline wall thickness meets the requirements of 10 CFR 50.61a.

The NRC staff requested that the licensee (a) identify the RV beltline forging and/or weld materials where the three beltline indications were discovered, and (b) state whether other indications were discovered in any of the subject Examination Category B-A and B-D RV welds outside of the beltline region. By letter dated March 29, 2012, the licensee stated that all three of the RV beltline indications are located in the Intermediate Shell Forging, and during the most recent ISI, a total of 76 indications were identified during the performance of the Examination Category B-A and B-D examinations, including the three beltline indications reported in Table 2 of RR 11-MN-002. The licensee stated that the three Intermediate Shell Forging indications reported in Table 2 are the only beltline indications, and that all of the 76 recorded indications were found to be acceptable for continued service per the ASME Code, Section XI, IWB-3500, flaw acceptance standards. The NRC staff reviewed this information and determined that the licensee had adequately reported the results of their previous ISI examination. Furthermore, the NRC staff determined that the three RV beltline indications reported in Table 2 are bounded by the limits set in 10 CFR 50.61a because the indications meet the acceptance standards of the ASME Code, Section XI, IWB-3500, and are located outside the inner one inch of the RV beltline wall thickness. The remaining indications discussed in the licensee's RAI response dated March 29, 2012, are located outside the beltline region and are acceptable for continued service per the acceptance standards of IWB-3500. Therefore, the NRC staff found that the licensee satisfied the second criterion for plant-specific application of the WCAP methodologies.

With respect to the third criterion to be used for plant-specific application of the WCAP methodologies, the NRC staff reviewed the licensee's submittal in RR 11-MN-002 to determine whether the licensee adequately demonstrated that the 95th percentile  $TWCF_{TOTAL}$  value for the McGuire 2 RV is bounded by the corresponding value from the Westinghouse pilot plant analysis in the WCAP. The NRC staff verified that the licensee accurately calculated  $\Delta T_{30}$

and  $RT_{MAX-X}$  for the McGuire 2 limiting RV beltline circumferential weld and forging materials at the end of the 60-year licensed operating period using the NRC-approved methods in RG 1.99, Rev. 2. The NRC staff verified that the 95th percentile  $TWCF_{TOTAL}$  value for the McGuire 2 RV was accurately calculated using the methodology in NUREG-1874. The bounding value for the 95th percentile  $TWCF_{TOTAL}$  value from the Westinghouse pilot plant analysis is  $1.76 \times 10^{-8}$  events per operating year. The 95th percentile  $TWCF_{TOTAL}$  value for the McGuire 2 RV is  $6.49 \times 10^{-12}$  events per operating year and is, therefore, bounded by the Westinghouse pilot plant analysis. Therefore, the NRC staff found that the licensee satisfied the third criterion for plant-specific application of the WCAP methodologies.

The fourth criterion specified for plant-specific application of the WCAP methodologies applies only to Babcock and Wilcox plants and, therefore, does need to be addressed for RR 11-MN-002.

For the fifth criterion specified for plant-specific application of the WCAP methodologies, the NRC staff reviewed RR 11-MN-002 to determine whether McGuire 2 has RV forgings that are susceptible to underclad cracking and if these forgings have  $RT_{MAX FO}$  values exceeding 240 °F. As stated in the NRC staff SE for the WCAP, the WCAP analyses are not applicable if the subject plant meets both of these conditions, and the licensee for the plant must submit a plant-specific evaluation for any extension to the 10-year ISI interval for ASME Code, Section XI, Examination Category B-A and B-D RV welds. The NRC staff noted that the RV shell forgings at McGuire 2 are SA-508, Class 2 material, which may be susceptible to underclad cracking, based on the criteria in RG 1.43, "Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components," Rev. 1, March 2011 (ADAMS Accession No. ML101670458). Therefore, in an RAI question 3, the NRC staff requested that the licensee state whether the SA-508, Class 2 forgings are deemed susceptible to underclad cracking, based on the criteria in RG 1.43. The licensee stated in its March 29, 2012, response to RAI question 3 that it was conservatively assumed that the SA-508, Class 2, RV forgings are susceptible to underclad cracking. However, the NRC staff verified that the  $RT_{MAX FO}$  value for the McGuire 2 RV forgings is 144°F, which is less than the 240°F maximum allowable value for application of the WCAP methodologies, if the forgings are susceptible. Therefore, the NRC staff found that the licensee satisfied the fifth criterion for plant-specific application of the WCAP methodologies.

Based on its review of RR 11-MN-002, the NRC staff found that the licensee has satisfied all five criteria for demonstrating that McGuire 2 is bounded by the Westinghouse pilot plant analysis from the WCAP. Therefore, the NRC staff finds that the licensee has sufficient technical basis for applying the risk-informed provisions of the WCAP to the McGuire 2 RV. Accordingly, the NRC staff determined that there is no significant additional risk associated with extending the third 10-year interval ISI interval for the ASME Code Class 1, Examination Category B-A and B-D RV welds, as specified in RR 11-MN-002, at McGuire 2 for an additional 10 years.

## 5.0 CONCLUSION

As set forth above, the NRC staff has determined that the proposed alternative for extending the ISI interval for the ASME Code Class 1, Examination Category B-A and B-D RV welds at McGuire 2, as specified in RR 11-MN-002, would provide an acceptable level of quality and safety. This conclusion is based on the fact that the plant-specific information provided by the

licensee is bounded by the applicable pilot plant analysis from the WCAP and that the licensee's proposed alternative described in RR 11-MN-002 meets all the conditions described in the WCAP. Therefore, The NRC staff authorizes the use of RR 11-MN-002 pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year interval ISI program at McGuire 2.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: C. Sydnor, NRR

Date: September 6, 2012

S. Capps

- 2 -

If you have any questions, please contact the Project Manager, Jon H. Thompson at 301-415-1119 or via e-mail at [jon.thompson@nrc.gov](mailto:jon.thompson@nrc.gov).

Sincerely,

*/ra/*

Robert J. Pascarelli, Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-370

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