



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

April 12, 2011

Mr. John T. Carlin
Vice President R.E. Ginna Nuclear Power Plant
R.E. Ginna Nuclear Power Plant, LLC
1503 Lake Road
Ontario, NY 14519

SUBJECT: FOURTH INTERVAL INSERVICE INSPECTION (ISI) PROGRAM RELIEF
REQUEST ISI-04 - R.E. GINNA NUCLEAR POWER PLANT (TAC NO. ME5120)

Dear Mr. Carlin:

By letter dated November 24, 2010, as supplemented on February 25, 2011, R.E. Ginna Nuclear Power Plant, LLC, the licensee, submitted request for relief ISI-04 from certain examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at the R.E. Ginna Nuclear Power Plant. Specifically, the licensee proposed using a root mean square error (RMSE) criterion for sizing flaws that is greater than the requirements of ASME Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds."

Based on our review and evaluation, the Nuclear Regulatory Commission concludes that compliance with the N-695 required 0.125-inch RMSE for depth sizing is impractical, and that the proposed alternative provides reasonable assurance of structural integrity of the dissimilar metal welds that will be examined during the fourth 10-year ISI interval, 2011 refueling outage. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 50.55a(g)(6)(i), relief is granted for the fourth 10-year ISI interval.

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

Please contact Douglas Pickett at 301-415-1364 if you have any questions.

Sincerely,

A handwritten signature in cursive script that reads "Nancy L. Salgado".

Nancy L. Salgado, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-244

Enclosure:
Safety Evaluation

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO REQUEST FOR RELIEF ISI-04 FOR THE

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

R.E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

By letter dated November 24, 2010, R.E. Ginna Nuclear Power Plant, LLC, the licensee, submitted request for relief ISI-04 (Agencywide Documents Access & Management System (ADAMS) Accession Number ML103350217) from certain examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at the R.E. Ginna Nuclear Power Plant (Ginna). Specifically, the licensee proposed using a root mean square error (RMSE) criterion for sizing flaws that is greater than the requirements of ASME Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds," (N-695). N-695 is referenced in Regulatory Guide (RG) 1.147, Revision 16, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." The licensee provided a response to the Nuclear Regulatory Commission (NRC) request for additional information (RAI) in a letter dated February 25, 2011 (ML110610741). The request is for the 2011 refueling outage (RFO), which is part of the fourth 10-year inservice inspection (ISI) interval which began January 1, 2000, and is scheduled to end May 30, 2011.

In support of this review, the NRC staff used information included in the approval of Relief Request No. 19 for the Ginna facility (ML090330300). Relief Request No. 19 deferred examination of the subject welds until the 2011 RFO.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used when authorized by the NRC, if the 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.

Enclosure

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for ISI of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. 10 CFR 50.55a(g)(4)(iv) states that inservice examination of components and system pressure tests may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in paragraph 10 CFR 50.55a(b), subject to the limitations and modification listed in 10 CFR 50.55a(b) and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met. The code of record for the fourth 10-year ISI interval at Ginna is the 1995 Edition with 1996 Addenda of the ASME Code.

3.0 TECHNICAL EVALUATION FOR REQUEST

3.1 Affected Components

The affected components are dissimilar metal welds (DMWs) at the reactor pressure vessel (RPV) locations identified in the table below.

Code Category Item Number	Description	Weld Number	Pipe Nominal ID, Inches	Nominal Wall Thickness, Inches (t)
B-F, B5.10	RC Nozzle to Pipe	PL-FW-II	29.0	3.25
	RC Nozzle to Pipe	PL-FW-IV	29.0	3.25
	RC Elbow to Pipe	PL-FW-V	27.5	3.25
	RC Elbow to Pipe	PL-FW-VII	27.5	3.25
	SI Safe End to Nozzle	AC-1002-1	3 -7/16	0.60
	SI Safe End to Nozzle	AC-1003-1	3 -7/16	0.60

RC = Reactor Coolant

SI = Safety Injection

3.2 Applicable Code

The fourth 10-year ISI interval Code of Record for ultrasonic testing (UT) is the 1995 Edition through 1996 Addenda of the ASME Code, Section XI, Appendix VIII, Supplement 10. Supplement 10, Paragraph 3.2(b) states that the RMS error for flaw depths estimated by UT shall not exceed 0.125-inch. However, the Code does not provide criteria for examinations performed from the inside diameter (ID) surface.

N-695 is an alternative to Supplement 10 that is endorsed by the NRC in RG 1.147, Revision 16. N-695, Paragraph 3.3(c), states that, "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, do not exceed 0.125 in.” N-695 provides for qualifications performed from either the ID or outside diameter (OD) of DMWs.

3.3 Proposed Alternative

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee considers the required examinations to be impractical. For the subject DMWs, the licensee proposes using 0.189-inch as an alternative depth-sizing RMS error value, which is greater than the 0.125-inch RMS error value stated in N-695. To compensate, the licensee will add the difference between the required RMS error value of 0.125-inch RMS and the actual RMS value achieved by the inspection vendor to the flaw depth as determined during flaw sizing.

3.4 Licensee's Basis for the Alternative

Ginna is performing volumetric examinations of the subject piping DMWs from the ID surface during the upcoming 2011 RFO in accordance with the Fourth Interval Relief Request No. 19. Ginna will implement the NRC-approved alternative requirements of N-695 for qualification.

Ginna proposes using the alternative RMSE depth sizing requirement as compared to the 0.125-inch RMSE value stated in N-695. The Electric Power Research Institute (EPRI) Non-Destructive Examination Center was contacted and confirmed with the Performance Demonstration Initiative (PDI) Administrator that no vendor has successfully demonstrated compliance with the Code-required 0.125-inch RMSE value for qualification tests for examinations conducted from the ID surface (for either stand-alone ASME Code, Section XI, Appendix VIII Supplement 10 or combined Supplement 2 and 10 qualifications.)

Ginna has verified through the PDI Administrator that the examination vendor selected to perform the scheduled examinations at Ginna has achieved a 0.189-inch RMSE for the Supplement 10 qualification and a 0.245-inch RMSE for the combined Supplement 2 and 10. The licensee stated in their RAI response that this request is specifically for Supplement 10 and no other supplements.

3.5 NRC Staff Evaluation

The licensee's ASME Code of Record for the fourth 10-year ISI interval is the 1995 Edition with 1996 Addenda of Section XI, which requires that DMWs are examined using procedures, equipment, and personnel qualified to Appendix VIII, Supplement 10. As an alternative to Supplement 10, the ASME Code developed N-695 for qualifications performed from either the ID or OD surfaces of DMWs. N-695 is endorsed in RG-1.147, Revision 16 with no conditions.

N-695 requires that the maximum error for flaw depth measurements, when compared to the true flaw depth, not exceed 0.125-inch RMSE. The U.S. nuclear power industry is using the PDI program to implement the performance demonstration required by N-695. The RMSE is a statistical measurement with a screening criterion for separating skilled personnel and effective procedures from those that are less accomplished. To date, no personnel or procedures have met the N-695 depth sizing qualification requirement for examinations performed from the ID surface. The current PDI program for qualifying procedures, equipment, and personnel on

dissimilar metal nozzle-to-safe end welds (similar configurations) from the ID is ineffective. The mockups used for the performance demonstrations are suppose to be representative of configurations common to the nuclear power industry. PDI had mockups fabricated to represent the extreme surface roughness (waviness) and pipe misalignment conditions that may exist in large diameter, thick wall, reactor coolant system (RCS) field welds. Smaller diameter, thinner wall mockups are available for add-on performance demonstration to the RCS test set. The RCS test mockups have ID surface locations that exceed PDI's recommended 1/32-inch maximum gap beneath the probe and work piece. The PDI selection of performance demonstration mockups is insufficient to assemble test sets with less demanding ID surface conditions. The industry's difficulty in meeting the RMSE requirement is associated with the PDI mockups, bounding surface condition roughness, and the currently available UT systems and techniques.

The PDI's test set mockups for Supplement 10 performance demonstrations are made using Inconel butter and in some cases, Inconel welds. The weld material selection differs from Ginna's welds which are made with stainless steel butters and weld materials. Ginna's material selection minimizes the probability of primary water stress-corrosion cracking degradation. The vendor selected by Ginna is (Supplement 10/N-695) qualified for flaw detection and length sizing of surface breaking flaws from the ID.

The licensee is also proposing to perform an alternative eddy current testing (ET) surface examination. The ET transducer has a much smaller footprint on the ID surface which is more capable of following surface contours (which minimizes the water path between transducer and surface). The ET would detect any surface breaking flaws and provide supporting information for the UT examinations.

The licensee proposed applying the vendor's RMSE from the EPRI-PDI performance demonstration program as an approximation of the actual flaw depth to provide a reasonable level of depth sizing capability. The licensee has stated that the vendor's RMSE demonstrated on the current mockups in the PDI program was 0.189-inch. The licensee proposed adding the depth sizing difference between the demonstrated 0.189-inch RMSE and the ASME Code required 0.125-inch RMSE to the measured value of any flaw detected during DMW examinations.

The RMSE is a statistical measurement. The worst-case error associated with satisfying the 0.125-inch RMSE, Supplement 10 requirement is 0.395-inches which is based on a performance demonstration test set with 9 flaws measured precisely and the 10th flaw with maximum error. For a vendor's performance demonstration using a test set with 10 flaws that has a calculated 0.189-inch RMSE, the worse-case error is 0.60-inches (i.e., 9 flaws measured precisely and the 10th flaw with maximum error).

The licensee is proposing to use 0.125-inch RMSE as an acceptable tolerance for subtracting from an individual's performance demonstrated RMSE. The application of RMSE as a tolerance for field applications has some inherent inaccuracies that normally exist between a performance demonstration environment (lax time constraints and ideal office environment) and field applications (outage constraints and field environment). Using the 0.125-inch tolerance to adjust an individual's RMSE does not take into consideration the RMSE from a successful performance demonstration which is normally less than the ASME Code-required maximum

RMSE acceptance value. With an absence of representative mockups (less severe ID surface roughness in the PDI program) of the licensee's pressurized-water reactor RCS DMWs, the licensee's vendor is unable to qualify personnel and procedures to the ASME Code-requirement. The NRC and PDI have been discussing the RMSE issue at semiannual public meetings with industry representatives (most recently on January 11, 2011, ML110110700).

The licensee provided, in the RAI response, a discussion of its vendor participation in three non-ASME Code depth sizing performance demonstrations of planar flaws in DMWs. Two non-blind demonstrations were performed on mockups containing a total of 26 ID connected flaws and one blind demonstration was performed on mockups containing 6 ID connected flaws that was proctored by an independent third party. The ID diameters of the mockups ranged from 23.5 to 29.0-inches and wall thicknesses ranged from 2.9 to 3.3-inches. The mockups had smooth ID surfaces and were fabricated using a variety of material and configurations, i.e., tapered surfaces, clad carbon steel, counter-bore, Inconel butter, Inconel weld, carbon steel nozzle forgings, and stainless steel safe-end forgings. The materials exhibited different acoustic properties, and a variety of grained microstructures that have been shown, in previous studies, to greatly influence the UT accuracy in locating and sizing planar flaws in austenitic materials. The demonstration differences are known factors that contribute to the variations in RMSE values. The combined data from the three demonstrations produced an RMSE of 0.092-inches which satisfies the ASME Code RMSE depth sizing requirement for DMWs of 0.125-inches. Although the ID surfaces for these mockups were much smoother than the ID surfaces of the PDI performance demonstration test mockups, the demonstrations give reasonable expectations that transducers located on smooth ID surfaces would detect and size flaws within the ASME Code screening criterion of 0.125-inch RMSE using the vendor's procedure and personnel.

The mockups used in the demonstrations were reasonable representations of the subject welds. A prior visual examination of Ginna's large bore nozzles indicated that the ID surfaces were smooth to the counter-bore region. The visual examination indicated the possibility of localized manual grinding and weld shrinkage within the counter-bore regions. The medium bore safety injection nozzles have no counter-bore, and the licensee expects them to have smooth surfaces. Ginna will be taking surface profile readings during the 2011 RFO examinations to identify the areas where the water path under the transducer is greater than 1/32-inch (a greater water path is known to contribute to decreased examination coverage).

The licensee has evaluated the applicability of performing examinations of the subject welds from the OD. The licensee stated (in an RAI response for Relief Request No. 19) that an inspection performed from the OD would have coverage of 0% for two welds and 50% for the remaining 4 welds due to physical obstructions. Crack depth sizing would be nonexistent for the two welds without coverage and 50% for the remaining welds. The licensee has complete access to the subject welds from the ID. Based on the 100% ID examination coverage and proposed crack depth sizing adjustments, the licensee concluded that OD examinations for the subject welds are less effective for detecting and sizing structurally significant cracks than ID examinations.

To satisfy ASME Code depth sizing requirements, Ginna would have to replicate the welds surface roughness/waviness, identify areas that exceed the recommended gap between transducer and surface, condition the ID to the recommended surface smoothness, design and

procure test mockups, qualify vendors, and reexamining the welds. The time necessary to achieve qualified procedures and personnel for the examination of the subject welds would extend the 2011 RFO time-line, which is considered impractical at this time.

Based on the above evaluation, the NRC staff finds that compliance with the N-695 required 0.125-inch RMSE, at this time, is impractical. Adding the difference between the performance demonstrate depth sizing RMSE and the N-695 required depth sizing RMSE to a flaw size and applying the standards specified in ASME Code, Section XI, IWB-3500 to determine acceptability, provides reasonable assurance that structural integrity is being maintained for the subject DMWs.

4.0 CONCLUSION

Based on the above review and evaluation, the NRC staff concludes that compliance with the N-695 required 0.125-inch RMSE for depth sizing is impractical, and that the proposed alternative to add to the depth of a flaw the difference between 0.189-inch RMSE and the ASME Code-required value (0.189-inch minus 0.125-inch = 0.064-inch) provides reasonable assurance of structural integrity of the DMWs that will be examined during the fourth 10-year ISI interval, 2011 RFO. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted to Ginna for the fourth 10-year ISI interval, 2011 RFO. The fourth 10-year ISI interval began January 1, 2000, and is scheduled to end May 30, 2011. The granting of relief is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest, given the consideration of the burden upon the licensee.

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

Principal Contributor: Don Naujock, NRR

Date: April 12, 2011

April 12, 2011

Mr. John T. Carlin
Vice President R.E. Ginna Nuclear Power Plant
R.E. Ginna Nuclear Power Plant, LLC
1503 Lake Road
Ontario, NY 14519

SUBJECT: FOURTH INTERVAL INSERVICE INSPECTION (ISI) PROGRAM RELIEF
REQUEST ISI-04 - R.E. GINNA NUCLEAR POWER PLANT (TAC NO. ME5120)

Dear Mr. Carlin:

By letter dated November 24, 2010, as supplemented on February 25, 2011, R.E. Ginna Nuclear Power Plant, LLC, the licensee, submitted request for relief ISI-04 from certain examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at the R.E. Ginna Nuclear Power Plant. Specifically, the licensee proposed using a root mean square error (RMSE) criterion for sizing flaws that is greater than the requirements of ASME Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds."

Based on our review and evaluation, the Nuclear Regulatory Commission concludes that compliance with the N-695 required 0.125-inch RMSE for depth sizing is impractical, and that the proposed alternative provides reasonable assurance of structural integrity of the dissimilar metal welds that will be examined during the fourth 10-year ISI interval, 2011 refueling outage. Therefore, pursuant to Title 10 of the *Code of Federal Regulations* 50.55a(g)(6)(i), relief is granted for the fourth 10-year ISI interval.

Sincerely,

/ra/

Nancy L. Salgado, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-244
Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

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