



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

August 2, 2013

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 – REQUEST FOR
ALTERNATIVE W3-1SI-021, ASME CODE CASE N-770-1 BASELINE
EXAMINATION (TAC NO. MF0325)

Dear Sir or Madam:

By letter dated November 30, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12339A070), Entergy Operations, Inc. (the licensee), submitted request for alternative W3-1SI-021, "ASME [American Society of Mechanical Engineers] Code Case N-770-1 Baseline Examination Request for Alternative," for U.S. Nuclear Regulatory Commission (NRC) review and authorization. Specifically, the licensee proposed to defer an inspection required by paragraph 50.55a(g)(6)(ii)(F) of Title 10 of the *Code of Federal Regulations* (10 CFR) at the Waterford Steam Electric Station, Unit 3 (Waterford 3), for one cycle of the third 10-year inservice inspection (ISI) interval. The licensee provided information on the impracticality associated with obtaining Appendix VIII-qualifications for the inspection procedure used to inspect the Class 1 Weld 08-007, Reactor Coolant Pump (RCP)-1A cold-leg charging nozzle and, pursuant to 10 CFR 50.55a(a)(3)(i), requested an alternative to the requirements of Code Case N770-1, as conditioned in the Final Rule (76 FR 36232; June 21, 2011) for 10 CFR 50.55a(g)(6)(ii)(F)(3) for the fall 2012 Waterford 3 refueling outage.

Request for Alternative W3-1SI-021 covers the RCP-1A Cold Leg Charging Nozzle Class 1 Weld 08-007, which was inspected by this "best effort" examination with 100 percent coverage. While the inspection procedure was not Appendix VIII-qualified, the inspection procedure utilized a phased-array search unit and used a wide range and a large number of inspection angles. The wide range and large number of inspection angles make the technique robust and relatively insensitive to the taper of the weld. Additionally, the use of a phased-array search unit allows for electronic focusing, making the procedure able to compensate for thickness variations. The NRC staff has determined that the 100 percent inspection using this phased-array procedure provides reasonable assurance of structural integrity and leak tightness of Weld 08-007.

The licensee has committed to work with the Electric Power Research Institute to develop an appropriate mockup that incorporates the configuration of the Waterford 3 08-007 dissimilar metal weld. If the procedure URS-UT-PA-DMW-1 has its Performance Demonstration Initiative qualifications expanded using this mockup to cover the thickness and taper of Weld 08-007 before the next refueling outage, the inspection performed in refueling outage RF18 will be considered a fully qualified examination. Otherwise, the licensee has committed to perform

additional scanning as required using an ASME Code, Section XI, Appendix VIII-qualified procedure to inspect the weld during the next refueling outage.

If an approved ASME Code, Section XI, procedure cannot be developed, Weld 08-007 will need to be modified to achieve an inspectable configuration, and an examination performed using an ASME Code, Section XI, Appendix VIII-qualified procedure.

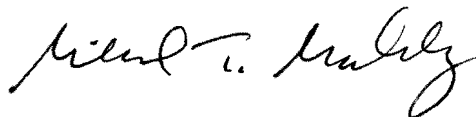
While the licensee requested NRC authorization pursuant to 10 CFR 50.55a(a)(3)(i), for the use of a proposed alternative on the basis that the alternative provides an acceptable level of quality and safety, in view of the above, the NRC staff evaluation determined that the request would be reviewed pursuant to 10 CFR 50.55a(g)(6)(i), on the basis that the current Code requirements are impractical, is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, the NRC staff grants the licensee's Request for Alternative, W3-ISI-021, at Waterford 3, until the scheduled refueling outage in spring 2014.

In view of the urgent need, the NRC staff granted a verbal authorization of this relief request on December 18, 2012 (ADAMS Accession No. ML13085A159).

All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized in the subject proposed alternative remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

The NRC staff's safety evaluation is enclosed.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael T. Markley".

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

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

REQUEST FOR ALTERNATIVE W3-ISI-021

FOR THE THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By letter dated November 30, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12339A070), Entergy Operations, Inc., the licensee, submitted relief request W3-ISI-021, requesting relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR [Pressurized Water Reactor] Piping and Vessel Nozzle Butt Welds Fabricated with UNS [Unified Numbering System] N06082 or UNS W86182 Weld Filler Material With or Without Application of listed Mitigation Activities, Section XI, Division 1." The licensee proposed to defer an inspection required by paragraph 50.55a(g)(6)(ii)(F) of Title 10 of the *Code of Federal Regulations* (10 CFR) at the Waterford Steam Electric Station, Unit 3 (Waterford 3), for one cycle of the third 10-year inservice inspection (ISI) interval. The third 10-year ISI interval began on May 31, 2008, and ends on June 30, 2017. The licensee provided information on the impracticality associated with obtaining Appendix VIII-qualifications for the inspection procedure used to inspect the Class 1 Weld 08-007, Reactor Coolant Pump (RCP)-1A cold-leg charging nozzle.

The licensee requested U.S. Nuclear Regulatory Commission (NRC) authorization pursuant to 10 CFR 50.55a(a)(3)(i), for the use of a proposed alternative on the basis that the alternative provides an acceptable level of quality and safety. The NRC staff evaluated the licensee's submittal and determined that the request would be reviewed pursuant to 10 CFR 50.55a(g)(6)(i), on the basis that the current Code requirements are impractical.

Verbal authorization of this relief request was granted on December 18, 2012 (ADAMS Accession No. ML13085A159).

2.0 REGULATORY EVALUATION

The NRC staff reviewed the licensee's proposed alternative for the inspection of the Class 1 RCP-1A cold-leg charging nozzle piping weld designated 08-007 under the requirements of 10 CFR 50.55a(g)(6)(i).

Enclosure

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, 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 120-month 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) 12 months prior to the start of the 120-month interval, subject to the conditions listed therein.

The regulations in 10 CFR 50.55a(g)(5)(iii) state, in part, that licensees may determine that conformance with certain code requirements is impractical and that the licensee shall notify the Commission and submit information in support of the determination.

The regulations in 10 CFR 50.55a(g)(6)(i) state that the Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Based on the above, and subject to the following technical evaluation, the NRC staff concludes that regulatory authority exists for the licensee to request and the Commission to grant the relief requested by the licensee

3.0 TECHNICAL EVALUATION

3.1 Component Description

The RCP-1A cold-leg charging nozzle weld 08-007 is a Class 1 dissimilar metal weld (DMW) joining a stainless steel safe-end to a carbon steel nozzle using Alloy 182 weld metal. The safe-end to nozzle transition has a taper of approximately 12 degrees. The diameter of the weld is 6.2 inches at the widest point. The thickness of the weld is approximately 1.4 inches. The component is normally at cold-leg temperatures.

The normal classification for this weld would be ASME Code, Section XI, Examination Category B-J, "Pressure Retaining Weld in Piping." Under ASME Code Case N-770-1, the weld is considered Item B – "Unmitigated butt weld at cold leg operating temperature."

3.2 Code Requirement

The Code of record is the ASME Code, Rules for Inservice Inspection of Nuclear Power Plant Components, Section XI, 2001 Edition through 2003 Addenda, as amended by 10 CFR 50.55a.

Weld 08-007 is a DMW covered by ASME Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of listed Mitigation Activities, Section XI, Division 1."

The regulations in 10 CFR 50.55a(g)(6)(ii)(F)(3) state:

Baseline examinations for welds in Table 1, Inspection Items A-1, A-2, and B, shall be completed by the end of the next refueling outage after January 20, 2012. Previous examinations of these welds can be credited for baseline examinations if they were performed within the re-inspection period for the weld item in Table 1 using Section XI, Appendix VIII requirements and met the Code required examination volume of essentially 100 percent. Other previous examinations that do not meet these requirements can be used to meet the baseline examination requirement, provided NRC approval of alternative inspection requirements in accordance with paragraphs (a) (3)(i) or (a)(3)(ii) of this section is granted prior to the end of the next refueling outage after January 20, 2012.

As Weld 08-007 is at cold-leg temperatures and has not been mitigated, it is classified as Inspection item 'B' for which visual and essentially 100 percent volumetric examination, as amended by 10 CFR 50.55a(g)(6)(ii)(F)(4), are required.

3.3 Requested Relief

The licensee is requesting relief from the requirements of Code Case N-770-1, as conditioned in the Final Rule (76 FR 36323; June 21, 2011) for 10 CFR 50.55a(g)(6)(ii)(F)(3) for the fall 2012 Waterford 3 refueling outage. The licensee is requesting permission to defer the 10 CFR 50.55a(g)(6)(ii)(F)(3) baseline volumetric examination of Weld 08-007, 2-inch cold-leg charging nozzle to safe-end dissimilar metal butt weld, for one cycle past the required deadline specified in 10 CFR 50.55a(g)(6)(ii)(F)(3).

3.4 Basis for Relief

In its letter dated November 30, 2012, the licensee stated, in part, that

The Materials Reliability Program document MRP-139 "Primary System Piping Butt Weld Inspection and Evaluation Guidelines" was not applicable for welds less than 4 inch NPS [nominal pipe size]. Issuance of the revised final rule 10CFR50.55a effective on August 22, 2011 to require implementation of ASME Code Case N-770-1 made UT [ultrasonic test] exams applicable for welds up to 2 inch NPS. Therefore, this weld was never inspected using a PDI qualified examination.

Weld 08-007 is found in cold leg temperature (T_{cold}) regions of the system. This means there is a lower probability of crack initiation, and a slower crack growth rate. This weld is also very highly flaw tolerant, as demonstrated in the MRP-109 report...

A "best effort" examination technique was performed on Weld 08-007 using a technique qualified by EPRI [the Electric Power Research Institute] for the Charging Nozzle tapered configuration. EPRI procedure for Manual Phased Array Ultrasonic examination of Dissimilar Metal Welds (EPRI-DMW-PA-1)

provides for this technique, and was successfully used on this and other components with similar configurations, tapers, and thicknesses.

The equipment, procedure, and personnel utilized for the performance of the "best effort" examination were qualified in accordance with the requirements of ASME Section XI, Appendix VIII, Supplement 10, as implemented through the Performance Demonstration Initiative (PDI) program. Our Vendor was qualified through Performance Demonstration Initiative (PDI) and we provided Entergy oversight of the process. Procedure EPRI-DMW-PA- 1 Revision 2, for the Phased Array Ultrasonic Examination of Dissimilar Metal Welds was used to perform the examinations.

While the thickness and tapers of weld 08-007 were outside the EPRI-qualified ranges, the technique used provided a reliable examination with high confidence of the detection of an ID [inside diameter] connected planer flaw in either the axial or circumferential directions. Entergy considers this a "best effort" examination and fully believes that the techniques employed for this examination were sufficient and capable of detecting any ID connected flaws, thus providing assurance the weld is acceptable. Note, there was an acceptable recordable spot indication found on one scan direction of 32% of reference in the safe end base metal outside of the examination volume with the indication being seen in the other 3 scanning directions but at below recordable amplitudes.

...the leak detection methodology presently used by the industry is very sensitive. After a number of recent operating events, the industry imposed an NEI 03-08 "needed" requirement, to improve leak detection capability. As a result, virtually all pressurized water reactors (PWRs) in the United States, including Waterford 3, have a leak defection capability of less than or equal to 0.1 gpm [gallons per minute]. All plants, including Waterford 3, also monitor seven day moving averages of reactor coolant system leak rates.

Action response times following a leak detection vary based on the action level exceeded, and range up to containment entry to identify the source of the leak.

3.5 Proposed Alternative (as stated by the licensee)

Entergy will perform appropriate actions to comply with ASME Section XI Code Case N-770-1 baseline examinations for dissimilar metal weld 08-007.... Actions to accomplish compliance with ASME Section XI Code Case N-770-1 consist of the following:

1. Entergy licensee will work with EPRI to design a mock up that incorporates the configuration of the Waterford 3 08-007 DM weld.
2. This mock-up will be used to demonstrate/qualify the UT technique utilized during the Fall 2012 refueling outage (RF18). This UT technique will be performed in accordance with the PDI Site Specific Configuration Mockup Requirements for DM Welds or through procedure expansion in accordance with the PDI Program. If the demonstration should determine

that additional scanning is required, Entergy will reexamine weld 08-007 during the scheduled Spring 2014 refueling outage using the newly qualified PDI technique for this configuration

3.6 Duration of Proposed Relief (as stated by the licensee)

The duration of the proposed alternative for Weld 08-007 is until prior to startup following the next WF 3 [Waterford 3] refueling outage planned for the Spring 2014.

3.7 NRC Staff Evaluation

The Class 1 Weld 08-007, RCP-1A Cold Leg Charging Nozzle, is within the scope of ASME Code Case N-770-1 and is required to have a visual and essentially 100 percent volumetric examination, as amended by 10 CFR 50.55a(g)(6)(ii)(F)(4), prior to startup following Refueling Outage 18 which was in progress when relief request W3-ISI-021 was made and verbal relief was granted. Measurements taken during the outage showed that there is not a currently qualified procedure to examine Weld 08-007. The weld thickness and tapered angle are outside the tolerances for the PDI mockups used for qualification. The licensee used a procedure, URS-UT-PA-DMW-1, to inspect the weld that was not qualified to Appendix VIII but was considered the best option for the weld.

As the thickness and angle measurements needed to be taken during the outage, it was not possible for the appropriate mockups to be designed and built for the procedure to be qualified prior to the outage. The NRC staff agrees that delaying the plant startup until a suitable mockup could be designed, built, and the procedure-qualified would impose a severe burden on the licensee.

Weld 08-007 was inspected by this "best effort" examination with 100 percent coverage. While the inspection procedure was not Appendix VIII-qualified, the inspection procedure utilized a phased-array search unit and used a wide range and a large number of inspection angles. The wide range and large number of inspection angles make the technique robust and relatively insensitive to the taper of the weld. Additionally, the use of a phased-array search unit allows for electronic focusing, making the procedure able to compensate for thickness variations. The NRC staff has determined that the 100 percent inspection using this phased-array procedure provides reasonable assurance of structural integrity and leak tightness of Weld 08-007.

The licensee has committed to work with EPRI to develop an appropriate mockup that incorporates the configuration of the Waterford 3 08-007 DMW. If the procedure URS-UT-PA-DMW-1 has its PDI qualifications expanded using this mockup to cover the thickness and taper of Weld 08-007 before the next refueling outage, the inspection performed in refueling outage 18 will be considered a fully-qualified examination. Otherwise, the licensee has committed to perform additional scanning as required using an ASME Code, Section XI, Appendix VIII-qualified procedure to inspect the weld during the next refueling outage.

If an approved ASME Code Section XI procedure cannot be developed, Weld 08-007 will need to be modified to achieve an inspectable configuration, and an examination performed using an ASME Code, Section XI, Appendix VIII qualified procedure.

3.8 Commitment

In its application dated November 30, 2012, the licensee has made the following Regulatory Commitment, prior to start-up following the Spring 2014 Refueling Outage (RF19):

Waterford 3 will perform appropriate actions to comply with ASME Section XI Code Case N-770-1 baseline examinations for dissimilar metal weld 08-007 prior to startup from the planned Spring 2014 refueling outage. Actions to accomplish compliance with ASME Section XI Code Case N-770-1 consist of the following:

1. Entergy will work with EPRI to design a mock up that incorporates the configuration of the Waterford 3 08-007 DMW.
2. This mock-up will be used to demonstrate/qualify the UT technique utilized during the Fall refueling outage (RF18). This UT technique will be performed in accordance with the PDI Site Specific Configuration Mockup Requirements for DM Welds or through procedure expansion in accordance with the PDI Program. If the demonstration should determine that additional scanning is required, Entergy will reexamine weld 08-007 during the scheduled Spring 2014 refueling outage using the newly qualified PDI technique for this configuration.

The NRC staff concludes that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitments are provided by the licensee's administrative processes, including its commitment management program. The NRC staff has determined that the commitments do not warrant the creation of regulatory requirements, which would require prior NRC approval of subsequent changes. The NRC staff has agreed that Nuclear Energy Institute (NEI) 99-04, Revision 0, "Guidelines for Managing NRC Commitment Changes," provides reasonable guidance for the control of regulatory commitments made to the NRC staff (see Regulatory Issue Summary 2000-17, "Managing Regulatory Commitments Made by Power Reactor Licensees to the NRC Staff," dated September 21, 2000). The commitments should be controlled in accordance with industry guidance or comparable criteria employed by a specific licensee. The NRC staff may choose to verify the implementation and maintenance of these commitments in a future inspection or audit.

4.0 CONCLUSION

The NRC staff has determined that creating a site-specific mockup, qualifying an inspection procedure, and examining Weld 08-007 prior to plant startup is impractical. The proposed inspection provides reasonable assurance of structural integrity and leak-tightness of Weld 08-007. The staff has also determined that granting relief for W3-ISI-021, pursuant to 10 CFR 50.55a(g)(6)(i) 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 due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The staff therefore grants relief W3-ISI-021 for Waterford 3 for Weld 08-007 until prior to startup following the refueling outage planned for the spring of 2014.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: S. Cumblidge, NRR/DE/EPNB

Date: August 2, 2013

additional scanning as required using an ASME Code, Section XI, Appendix VIII-qualified procedure to inspect the weld during the next refueling outage.

If an approved ASME Code, Section XI, procedure cannot be developed, Weld 08-007 will need to be modified to achieve an inspectable configuration, and an examination performed using an ASME Code, Section XI, Appendix VIII-qualified procedure.

While the licensee requested NRC authorization pursuant to 10 CFR 50.55a(a)(3)(i), for the use of a proposed alternative on the basis that the alternative provides an acceptable level of quality and safety, in view of the above, the NRC staff evaluation determined that the request would be reviewed pursuant to 10 CFR 50.55a(g)(6)(i), on the basis that the current Code requirements are impractical, is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Therefore, the NRC staff grants the licensee's Request for Alternative, W3-ISI-021, at Waterford 3, until the scheduled refueling outage in spring 2014.

In view of the urgent need, the NRC staff granted a verbal authorization of this relief request on December 18, 2012 (ADAMS Accession No. ML13085A159).

All other ASME Code, Section XI requirements for which relief was not specifically requested and authorized in the subject proposed alternative remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

The NRC staff's safety evaluation is enclosed.

Sincerely,

/RA/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

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ADAMS Accession No. ML13192A222

*SE memo dated June 12, 2013

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