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W3F1-2013-0044 10 CFR 50.55a

September 26, 2013

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Waterford 3 Request for Alternative W3-ISI-023, ASME Code Case N-770-1 Successive Examinations
Waterford Steam Electric Station, Unit 3
Docket No. 50-382
License No. NPF-38

Dear Sir or Madam:

Pursuant to 10 CFR 50.55a(a)(3)(ii), Entergy Operations, Inc. (Entergy), proposes an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Code Case N-770-1, as conditioned by 10 CFR 50.55a(g)(6)(ii)(F) pertaining to volumetric examination of the dissimilar metal welds associated with the suction and discharge piping of the Reactor Coolant Pumps (RCP) and the Safety Injection (SI) nozzle to safe-ends at Waterford Steam Electric Station Unit 3. The required coverage cannot be obtained due to interference or geometry.

Entergy requests that the duration of the proposed alternative for the subject welds be granted for 54 months following the Spring 2014 examinations. Attachment 1 provides the specific alternate examination volume and a discussion of the basis for the request.

This request requires NRC approval prior to completing the Spring 2014 Waterford 3 refueling outage (RF-19). To support that outage, Entergy requests approval of this request by March 14, 2014.

This document contains new regulatory commitments which are identified in Attachment 2.

If you have any questions or require additional information, please contact me.

Sincerely,

BJP/RJP/GCP

Attachments: 1. Request for Alternative W3-ISI-023
2. List of Regulatory Commitments

cc: Mr. Steven A. Reynolds — RidsRgn4MailCenter@nrc.gov
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Attachment 1 to

W3F1-2013-0044

Request for Alternative W3-ISI-023

Waterford 3 Steam Electric Station 10 CFR 50.55a Request No. W3-ISI-023
Proposed Alternative in Accordance With 10 CFR 50.55a(a)(3)(ii)
--Hardship and Unusual Difficulty without Compensating Increase in Level of Quality or Safety--
(ASME Code Case N-770-1 Successive Examinations)

1. ASME Code Component(s) Affected / Applicable Code Edition

Components / Numbers: Pressure retaining dissimilar metal piping welds containing Alloy 600/82/182 materials

Component ID	Component Description
07-002	30” Reactor Coolant Pump (RCP) 1A Inlet Elbow (CS) to Safe-end (Cast SS)
08-014	30” RCP 1A Outlet Safe-end (Cast SS) to Pipe (CS)
09-016	30” RCP 1B Inlet Elbow (CS) to Safe-end (Cast SS)
10-002	30” RCP 1B Outlet Safe-end (Cast SS) to Pipe (CS)
11-002	30” RCP 2A Inlet Elbow (CS) to Safe-end (Cast SS)
13-016	30” RCP 2B Inlet Elbow (CS) to Safe-end (Cast SS)
14-002	30” RCP 2B Outlet Safe-end (Cast SS) to Pipe (CS)

Code Classes: American Society of Mechanical Engineers (ASME) Code Class 1

Examination Category: Code Case N-770-1, as conditioned by 10 CFR 50.55a(g)(6)(ii)(F)

Inspection Item: B

Description: Unmitigated Butt Weld at Cold Leg Operating Temperature

Unit / Inspection Interval Applicability: Waterford Steam Electric Station, Unit 3 / Third 10-Year Interval (concluding on June 30, 2017)

2. Applicable Code Requirements

10 CFR 50.55a(g)(6)(ii)(F)(1) requires "licensees of existing, operating pressurized water reactors as of July 21, 2011, shall implement the requirements of ASME Code Case N-770-1 [Reference 2], subject to the conditions specified in paragraphs (g)(6)(ii)(F)(2) through (g)(6)(ii)(F)(10) of this section, by the first refueling outage after August 22, 2011."

ASME Code Case N-770-1 requires successive examination of all Inspection Item B welds, as defined in Table 1 of the Code case, every second inspection period not to exceed seven years after the baseline examination is performed using Section XI, Appendix VIII requirements (Reference 2).

10 CFR 50.55a(g)(6)(ii)(F)(4) states "the axial examination coverage requirements of -2500(c) may not be considered to be satisfied unless essentially 100 percent coverage is achieved."

ASME Code Case N-460 allows a reduction in coverage due to interference or geometry as long as the overall coverage is greater than 90 percent (Reference 3). ASME Code Case N-460 has been unconditionally accepted by the NRC in Regulatory Guide 1.147, Revision 16.

3. Proposed Alternative Examinations

Entergy proposes to ultrasonically examine the subject welds at Waterford 3 to the extent provided in Table 1 for the Code Case N-770-1 examination coverage requirements. If the examination coverage of the subject welds in Table 1 is less than the weld with the bounding examination coverage, then additional relief request will be provided to the NRC following completion of these examinations.

4. Basis for Alternative

To obtain additional coverage would necessitate modification and/or replacement of the components.

The current limitation to the seven RCP inlet and outlet welds listed in Section 1 is due to weld joint limitations and not surface conditioning. To obtain additional axial coverage of just the Primary Water Stress Corrosion Cracking (PWSCC) susceptible material, weld build-up of the dissimilar metal butt weld would be required, along with additional contouring and an ASME Code, Section III, required radiographic (RT) examination. However, even this would not address the cast stainless steel limitation. There is one RCP outlet weld that was previously included in W3-ISI-020 that is expected to meet the requirements of Code Case N-770-1 examination requirements contained in Code Case N-770-1-2500(b). The weld contains cast stainless steel safe-ends and One Hundred (100) percent examination of the PWSCC susceptible material in both the axial and circumferential directions will be performed during RF19. Additionally the weld will be examined to the maximum extent practical.

The limitation to the four SI nozzles to safe-end welds is only due to the cast stainless steel material. One Hundred (100) percent examination of the PWSCC susceptible material in both the axial and circumferential directions will be performed during RF-19. The cast stainless steel material is also planned for examination to the maximum extent practical by Appendix VIII

procedures, thereby meeting the requirements of Code Case N-770-1 examination requirements contained in Code Case N-770-1-2500(b).

The credited baseline examination requirement of 10 CFR 50.55a(g)(6)(ii)(F) for the subject dissimilar metal welds (identified in Section 1 above) was performed during RF-16 in 2009. These examinations were performed using ASME Code, Section XI, Appendix VIII requirements. The examinations previously performed on the subject welds for the baseline could not obtain essentially 100 percent coverage of the required examination volume due to the weld taper and the presence of the cast austenitic stainless steel (CASS) safe-ends. Component specific details of each weld examination, including the percent of Code required coverage achieved, has been previously submitted (References 4, 5, and 6).

The NRC staff issued a safety evaluation (Reference 7) concerning the examination of the subject welds. In the safety evaluation, the NRC staff determined that fulfilling the essentially 100 percent examination requirements for axial flaws is not possible using current available technology and procedures. The NRC staff also concluded that complying with the specified requirement would require modification or replacement of the components which would constitute a hardship.

ASME Code Case N-770-1 requires successive examination of all Inspection B welds to be performed using Section XI, Appendix VIII requirements and meeting the Code Case required examination volume of essentially 100 percent.

The successive examinations are required to be performed during the Spring 2014 (RF-19) refueling outage. It should be noted that the examination of these welds performed in the credited baseline examinations used non-encoded Linear Phased Array (LPA) ultrasonic techniques. For the RF-19 scheduled examinations, phased array ultrasonic techniques are planned to be used with encoding for data capture, allowing independent review away from the examination location. These techniques are qualified in accordance with ASME Section XI, Appendix VIII, Supplement 10 for dissimilar metal welds and 10CFR 50.55a, and administered by the Performance Demonstration Initiative (PDI) Program. The use of the LPA ultrasonic techniques with encoding is not expected to significantly increase the examination volume coverage from the previous examinations due to the inherent access limitations of the weld configurations. Based on the experience provided by the baseline examinations, the overall coverage of the susceptible material may increase slightly due to developing enhanced scan plans that will provide detailed documentation of scan limitations.

The design configuration of the welds limits the volumetric examination to be performed primarily from the ferritic steel side of the welds. Due to the short length of the CASS safe-ends and the adjacent safe-end-to-pump welds and nozzle-to-safe end welds, there is not adequate surface from which to perform scanning from the safe-end side of the weld. Based on the previous baseline data and the known geometric limitations, it is anticipated that less than the required essentially 100 percent coverage will be obtained. Because of this, approval of an alternative request will be needed prior to the end of the refueling outage in which the examinations are performed. This alternative request is being submitted to allow for less than essentially 100 percent examination coverage. Table 1 (Attachment 1) provides the estimated coverage expected for the Spring 2014 examinations based upon the previous baseline results. The actual examination summary and coverage results will be provided to the NRC only if the actual examination coverage is less than the weld with the bounding examination coverage provided in Table 1.

Entergy previously provided information in letter W3F1-2012-0102 dated December 16, 2012 [ADAMS Accession ML12352A172] and in letter 2CAN121201 dated December 4, 2012 [ADAMS Accession ML 12340A449] indicating that analyses had concluded a postulated initial flaw that is 16.7% through wall would grow to the ASME Code allowable flaw size of 75% through wall in approximately 54 months from the inspection. The largest undetected flaw that could exist due to the examination limitations is 10% through wall, providing a margin of 6.7%.

Based on the scheduled inspections in Spring 2014 and obtaining examination coverage equal to or better than the most limiting coverage obtained in the 2009 examinations, the crack growth analysis supports operation of Waterford 3 for 54 months from the Spring 2014 exams. Waterford 3 will perform the examinations again in the Fall 2018 outage.

Entergy continues to monitor technology changes and plans to use the best available PDI qualified techniques to examine the subject piping welds, as practical. The examination techniques utilized in the 2009 examinations are essentially unchanged, continue to be the best available technology, and will be enhanced with encoding the data. To improve upon these examination coverage percentages, modification and/or replacement of the component would be required.

5. Conclusion

10 CFR 50.55a(a)(3) states:

"Proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant 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."

As discussed in Section 4 above, compliance with the requirements of Code Case N-770-1 as required by 10 CFR 50.55a(g)(6)(ii)(F) would result in a hardship without a compensating increase in the level of quality and safety. Therefore, Entergy requests authorization to perform the requested alternative to the Code case requirement pursuant to 10 CFR 50.55a(a)(3)(ii).

6. Duration of Proposed Alternative

Entergy requests that the duration of the proposed alternative for the subject welds be granted for 54 months following the Spring 2014 examinations.

7. References

1. ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition with 2003 Addenda, American Society of Mechanical Engineers, New York
2. ASME Section XI, Division 1, 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”
3. ASME Section XI, Division 1, Code Case N-460, “Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1”
4. Entergy letter to NRC, “Waterford 3 Request for Alternative W3-ISI-020, ASME Code Case N-770-1 Baseline Examination Request for Alternative,” dated October 16, 2012 (ML12296A241)
5. Entergy letter to NRC, “Waterford 3 Response to an NRC Request for Additional Information (RAI) associated with W3-ISI-020, Request for Alternative to ASME Code Case N-770-1 Baseline Examination,” dated November 15, 2012 (ML12324A170)
6. Entergy letter to NRC, “Waterford 3 Supplemental Response to an NRC Request for Additional Information (RAI) associated with W3-ISI-020, Request for Alternative to ASME Code Case N-770-1 Baseline Examination,” dated December 16, 2012 (ML12352A172)
7. NRC Safety Evaluation Approving W3-ISI-020 dated May 31, 2013 (ML13128A129)

Table 1

Component ID	Component Description	N-770-1[1] Volume Coverage Axial Scan for Circumferential Flaws	N-770-1[1] Volume Coverage Circumferential Scan for Axial Flaws	N-770-1[1] Volume Coverage Total %	Volume[2] Coverage of PWSCC Susceptible Material Axial Scan for Circumferential Flaws	Volume[2] Coverage of PWSCC Susceptible Material PDQS Qualified Circumferential Scan for Axial Flaws	Tapered[3] Weld PDQS Limitation
07-002	30” RCP 1A Inlet Elbow (CS) to Safe-end (CASS)	66%	53%	59.5%	100%	84.8%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe-end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					
08-014	30” RCP 1A Outlet Safe-end (CASS) to Pipe (CS)	64%	50%	57%	100%	67%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe-end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					
09-016	30” RCP 1B Inlet Elbow (CS) to Safe-end (CASS)	63%	52.5%	57.75%	100%	68%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe-end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					

Table 1

Component ID	Component Description	N-770-1[1] Volume Coverage Axial Scan for Circumferential Flaws	N-770-1[1] Volume Coverage Circumferential Scan for Axial Flaws	N-770-1[1] Volume Coverage Total %	Volume[2] Coverage of PWSCC Susceptible Material Axial Scan for Circumferential Flaws	Volume[2] Coverage of PWSCC Susceptible Material PDQS Qualified Circumferential Scan for Axial Flaws	Tapered[3] Weld PDQS Limitation
10-002	30” RCP 1B Outlet Safe-end (CASS) to Pipe (CS)	66%	53%	59.5%	100%	69%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					
11-002	30” RCP 2A Inlet Elbow (CS) to Safe-end (CASS)	64%	49%	56.5%	100%	65%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					
13-016	30” RCP 2B Inlet Elbow (CS) to Safe-end (CASS)	68%	54%	61%	100%	67.2%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					

Table 1

Component ID	Component Description	N-770-1[(1)] Volume Coverage Axial Scan for Circumferential Flaws	N-770-1[(1)] Volume Coverage Circumferential Scan for Axial Flaws	N-770-1[(1)] Volume Coverage Total %	Volume[(2)] Coverage of PWSCC Susceptible Material Axial Scan for Circumferential Flaws	Volume[(2)] Coverage of PWSCC Susceptible Material PDQS Qualified Circumferential Scan for Axial Flaws	Tapered[(3)] Weld PDQS Limitation
14-002	30” RCP 2B Outlet Safe-end (CASS) to Pipe (CS)	65%	52%	58.5%	100%	67%	Yes
Baseline PA-UT Limitations / Examination Summary		No examination performed from the safe end side of weld due to Cast SS material. Circumferential scan limitation due to the weld taper. No recordable indications within examination volume.					

Note 1 – For the ASME Code Case N-770-1 axial and circumferential flaw examination volume coverage estimates, the basis is Figure 1 of the Code case.
Note 2 – Estimated volume coverage based upon the PWSCC material only.
Note 3 - For weld profiles that have a tapered surface, the PDQS states that the procedure is not qualified to detect axial flaws on the far side (stainless steel side) of a single sided access. This would limit the qualified exams from the near side (carbon steel side) to the weld centerline including the PWSCC susceptible weld material scanned within this detectable region.
PDQS – Performance Demonstration Qualification Summary
PA-UT – Phased Array Ultrasonic Examination

Attachment 2 to

W3F1-2013-0044

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to the NRC by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
The actual examination summary and coverage results will be provided to the NRC only if the actual examination coverage is less than the weld with the bounding examination coverage provided in Table 1.	X		Prior to conclusion of Spring 2014 Waterford 3 Refueling Outage
Perform N-770-1 examination of the 30” and 12” RCS nozzles within 54 months of the Spring 2014 outage	X		Fall 2018 Waterford 3 Refueling Outage