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W3F1-2015-0005

January 19, 2015

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Subject: Waterford Steam Electric Station, Unit 3 Response to Request for Additional Information Regarding Reactor Vessel Internals Aging Management Program
Waterford Steam Electric Station, Unit 3 (Waterford 3)
Docket No. 50-382
License No. NPF-38

REFERENCES: 1. Entergy Letter W3F1-2013-0070, Submittal of Reactor Vessel Internals Aging Management Program Consistent with MRP-227-A, dated December 16, 2013. (ADAMS Accession No. ML13352A041)
2. Letter from NRC, Request for Additional Information Regarding the Reactor Vessel Internals Aging Management Program (TAC No. MF3247), dated October 21, 2014. (ADAMS Accession No. ML14232A023)

Dear Sir or Madam:

In letter dated December 16, 2013 (Reference 1), Entergy Operations, Inc. (Entergy) submitted a request for the NRC to review and Waterford 3's Reactor Vessel Aging Management Program (AMP) developed to implement MRP-227-A, Rev 0.

In letter dated October 21, 2014 (Reference 2), NRC requested Entergy to provide additional information to support review of the Reactor Vessel Internals Aging Management Program. This letter provides the response to RAI 1 and RAI 3 in Attachment 1.

This correspondence contains one new commitment as identified in Attachment 2. If you have any questions or require additional information, please contact the Regulatory Assurance Manager, John Jarrell, at 504-739-6685.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 19, 2015.

Sincerely,

A handwritten signature in black ink, appearing to read "MRC/SM". The signature is fluid and cursive, with a prominent initial "M" and a long, sweeping underline.

MRC/SM

- Attachments:
1. Waterford 3 Response to Request for Additional Information (TAC No.MF3247)
 2. List of Regulatory Commitment

cc: Mr. Marc L. Dapas, Regional Administrator
U.S. NRC, Region IV
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Attachment 1 to

W3F1-2015-0005

Waterford 3 Response to Request for Additional Information

(TAC No.MF3247)

RAI-1: Historically, the following materials used in the PWR RVI components are known to be susceptible to some of the aging degradation mechanisms that are identified in the MRP-227-A report. In this context, the U. S. Nuclear Regulatory Commission (NRC) staff requests that the licensee provide a list of any additional RVI components (not listed in MRP-227-A and MRP-191, Revision 0) that are manufactured from the following materials. If any of these materials is identified as an additional RVI component at WF3, identify the aging effect/mechanism combination to which the material is susceptible, and the type of aging management that will be implemented on these components.

Nickel base alloys—Inconel 600; Weld Metals—Alloy 82 and 182;

1. Alloy X-750,
2. Stainless steel type 347 material (excluding baffle-former bolts),
3. Precipitation hardened (PH) stainless steel materials—17-4 and 15-5,
4. Type 431 stainless steel material,
5. Alloy A-286, ASTM A 453 Grade 660, Condition A or B.

Response to RAI-1

The following table identifies the nickel base alloy WF3 Reactor Vessel Internals (RVI) components not listed in MRP-227 or MRP-191, aging effect, and mechanism.

Component Type	Aging Effect	Aging Mechanism
Core support barrel assembly (snubber assembly shims and pins)	Cracking	SCC
	Loss of material	Pitting and crevice
	Loss of material	Wear
	Reduction in Fracture Toughness	Irradiation embrittlement

Component Type	Aging Effect	Aging Mechanism
Core support barrel assembly (snubber assembly bolts)	Cracking	SCC
	Loss of material	Pitting and crevice
	Loss of preload	Irradiation-induced stress relaxation
	Reduction in Fracture Toughness	Irradiation embrittlement
ICI thimble tube coupling	Cracking	SCC
	Loss of material	Pitting and crevice
	Reduction in Fracture Toughness	Irradiation embrittlement

Based on a review of the RVI component drawings and bill of materials, WF3 does not have any additional components fabricated from the following stainless steels not addressed by MRP-227-A or MRP-191.

- Type 347
- Type 431
- 17-4 or 15-5 precipitation hardened
- Alloy A-286, ASTM A-453 Grade 660.

The type of aging management that will be implemented on these components has not been determined yet and a Westinghouse expert panel will review the above nickel alloy components and determine what inspection plan is needed. This information will be submitted to the NRC by July 10, 2015 and will be tracked by Waterford 3 using commitment A27621.

RAI-3: Chapter 7 of the MRP-227-A report addresses how a licensee will evaluate and disposition relevant plant-specific or generic operating experience (OE) that is applicable to RVI components at its PWR facility. The NRC staff requests that the licensee identify any and all generic and plant-specific OE that is applicable to the design of the RVI components including but not limited to OE that is applicable the following components at WF3: panel to former bolts (core barrel bolting, thermal shields (including positioning pins), fuel alignment pins, guide lug inserts and bolts, guide lugs, core support barrel girth welds none, in-core instrumentation flux thimble tubes, core barrel at the prior thermal shield bracket attachment areas, reactor vessel flow skirt, and, include the RVI components addressed in Table 2 of the December 16, 2013 submittal.

Response to RAI-3:

WF3 design does not include panel to former bolts, core barrel bolting, or thermal shields.

A keyword search of Waterford 3 and industry databases was conducted for from 2000 to present for the components listed below and against the keywords listed below.

Keywords:

- Loss of Material
- Wear
- Broken
- Crack
- Degradation
- PWSCC
- Failure
- Void Swelling
- Embrittlement
- Preload
- Reduction in fracture toughness

Components	Relevant Hits yielded
fuel alignment pins	0
guide lug inserts	0
guide bolts inserts	0
guide lug	0
core support barrel girth welds	0
in-core instrumentation flux thimble tubes	17
core barrel at the prior thermal shield bracket attachment areas	0
reactor vessel flow skirt	0
CEA shroud extension	0
CEA shroud bolts	0
Lower support structure	0

Components	Relevant Hits Yielded
Core support barrel upper core barrel flange	0
Lower core support flange weld	0
Core barrel axial welds and column welds	0
Core Barrel	1
Core shroud plate former plate welds	0
Core support shroud welds	0
Core support plate	0

Relevant OE exists describing the elongation of ICI thimble tubes by neutron void swelling at WF3 and CE plants. ICI tubes were replaced at Waterford 3 in RF16 to address this issue.

WF3 plant specific OE exists describing the ISI core barrel visual exam in which the 0 degree alignment key was identified backed off approximately 3/16" from the back of the core barrel keyway. A condition report was initiated and Combustion Engineering (CE) evaluated the conditions as acceptable as is. This was identified via normal ISI visual exams which are required by 10CFR50.55a and ASME Section XI.

Attachment 2

W3F1-2015-0005

List of Regulatory Commitment

List of Regulatory Commitments

The following table identifies those actions committed to 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	
Provide the NRC the results of the aging management review and the inspection plan on the components identified in the RAI 1 response.	X		July 10, 2015