



Phyllis

**From:** Clark, Phyllis  
**Sent:** Monday, December 19, 2016 7:25 AM  
**To:** 'mchisum@entergy.com'  
**Cc:** 'jjarrel@entergy.com'; 'dfrey@entergy.com'; 'lmurr91@entergy.com'; 'GYOUNG4@entergy.com'; 'Dlach@entergy.com'; 'ataylo1@entergy.com'; 'aharris@entergy.com'; 'Milster, Leia Elizabeth'; Ramirez, Frances; Speer, Chris; Wittick, Brian; Morey, Dennis; RidsNrrDlr Resource; RidsNrrDlrRpb1 Resource; RidsNrrDlrRerb Resource; RidsNrrDlrRarb Resource; RidsNrrDlrRasb Resource; RidsNrrDlrRsrg Resource; RidsNrrPMWaterford Resource; RidsRgn4MailCenter Resource; Folk, Kevin; Keegan, Elaine; Buford, Angela; Prinaris, Andrew; Wong, Albert; Huynh, Alan; Sweat, Tarico; Medoff, James; Gavula, James; Lopez, Juan; Cuadrado de Jesus, Samuel; Min, Seung; Obadina, Sarah; Sadollah, Mohammad; Rogers, Billy; Brittner, Donald; Fu, Bart; Allik, Brian; Lehman, Bryce; Gardner, William; Thomas, George; Mink, Aaron; Doutt, Clifford; Holston, William; Yoo, Mark; Pulvirenti, April; McIntyre, David; Burnell, Scott; Moreno, Angel; Kennedy, Kriss; Scott, Catherine; Yoder, Matthew; Chazell, Russell  
**Subject:** REF: WATERFORD STEAM ELECTRIC STATION, UNIT 3, LICENSE RENEWAL APPLICATION – RAI SET 11 (CAC NO. MF7492)  
**Attachments:** Waterford 3 LRA Final RAI Set 11.pdf

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

Mr. Michael R. Chisum  
Site Vice President  
Entergy Operations, Inc.

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE WATERFORD STEAM ELECTRIC STATION, UNIT 3, LICENSE RENEWAL APPLICATION – SET 11 (CAC NO. MF7492)

Dear Mr. Chisum:

By letter dated March 23, 2016, Entergy Operations, Inc. submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating license NPF-38 for Waterford Steam Electric Station, Unit 3. The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) is reviewing the information contained in the license renewal application and has identified areas where additional information is needed to complete the review.

The enclosed requests for additional information were discussed with Ms. Laurie Murray and a mutually agreeable date for the response is within 45 days from the date of this letter. If you have any questions, please contact me at 301-415-6447 or by e-mail at [Phyllis.Clark@nrc.gov](mailto:Phyllis.Clark@nrc.gov).

Sincerely,

*Phyllis Clark*

Phyllis Clark, Project Manager  
Projects Branch 1  
Division of License Renewal  
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosure:  
As stated

cc: Listserv

ADAMS Accession No.: **ML16 351A045** \*via email

OFFICE	PM:RPB1:DLR	BC:RPRB:DLR	BC:RPRB:DLR	Acting BC:RPB1:DLR	PM:RPB1:DLR
NAME	PClark	DMorey*	BWittick*	RChazell*	PClark
DATE	12/15/2016	12/15/2016	12/15/2016	12/15/2016	12/15/2016

**WATERFORD STEAM ELECTRIC STATION, UNIT 3**  
**LICENSE RENEWAL APPLICATION**  
**REQUESTS FOR ADDITIONAL INFORMATION – SET 11**  
**(CAC NO. MF7492)**

**RAI 3.1.1.81-1a**

Background:

In its letter dated November 10, 2016, the applicant responded to RAI 3.1.1.81-1 which addresses aging management of cracking due to stress corrosion cracking (SCC) for the reactor coolant pump (RCP) thermal barrier heat exchanger. In its response, the applicant indicated that the RCP thermal barrier heat exchanger is represented in LRA Table 3.1.2-3 by the component type “Heat exchanger – water jacket (seal heat exchanger). The LRA also indicates that this component type is associated with LRA item 3.1.1-33, which credits the Inservice Inspection Program and Water Chemistry Control – Primary and Secondary Program to manage cracking due to SCC.

Issue:

It is not clear to the staff what inspection activities are performed to manage cracking due to SCC for the thermal barrier heat exchanger components under the Inservice Inspection Program.

Request:

Describe what inspection activities are performed to manage cracking due to SCC for the thermal barrier heat exchanger components under the Inservice Inspection Program.

## **RAI B.1.10-4a**

### Background:

1. The response to RAI B.1.10-4 dated December 7, 2016, states that based on a review of operating experience, cracking is not an aging effect requiring management for the external surfaces of the stainless steel plant stack monitoring instrument tubing exposed to outdoor air in the Miscellaneous HVAC System (LRA Table 3.3.2-12). The response also states that, “[i]n addition, stainless steel tubing exposed to outdoor air is widely used in pressurized systems that are subject to aging management review at WF3. Identification of cracking caused by exposure of that tubing to outdoor air would be an indicator that corrective actions should be taken with respect to the stainless steel tubing in the miscellaneous HVAC system.”

LRA Section 3.3.2.2.3 states that cracking due to stress corrosion cracking could occur for stainless steel components exposed to outdoor air due to Waterford 3 being located near other industrial facilities, including chemical manufacturers, where chloride contamination of stainless steel components exposed to outdoor air may occur.

GALL Report AMP XI.M36, “External Surfaces Monitoring of Mechanical Components,” is not a sampling-based program.

2. The response to RAI B.1.10-4 dated December 7, 2016, states that aluminum heat exchanger fins in the Component Cooling and Auxiliary Component Cooling Water System (LRA Table 3.3.2-3) are not pressure boundary components, so inspection for leakage to indicate cracking is not applicable.

The response to RAI B.1.30-5 dated December 12, 2016, states that the External Surfaces Monitoring program employs visual inspections that will monitor accessible surfaces of the subject aluminum heat exchanger fins to manage loss of material.

3. The response to RAI B.1.10-4 dated December 7, 2016, states that the aluminum flame arrestor in the Auxiliary Diesel Generator System (LRA Table 3.3.2-13) was removed from the LRA based on a further review which determined that it does not perform the license renewal intended function of pressure boundary.

### Issue:

1. Although the RAI response states that a search of operating experience showed no instances of cracking of stainless steel components exposed to outdoor air, it is unclear to the staff why cracking is not an applicable aging effect for the stainless steel plant stack monitoring instrument tubing given that chloride contamination of stainless steel components exposed to outdoor air may occur due to Waterford 3 being located near other industrial facilities.

In addition, no basis was provided for why a sampling-based approach using other pressurized stainless steel components is acceptable when AMP XI.M36 is not a sampling-based program.

2. It is unclear to the staff why the aluminum heat exchanger fins performing a heat transfer intended function, as opposed to a pressure boundary intended function precludes the need to manage cracking for these components. For example, cracking could, over time, lead to loss of fins and a corresponding reduction in heat transfer. The staff noted that the December 12, 2016, letter states that visual inspections will monitor accessible surfaces of the fins to manage loss of material; however, the statement does not include cracking as an aging effect requiring management.

3. Although the aluminum flame arrestor might not perform a pressure boundary intended function, it is unclear to the staff why this component was removed from the LRA given that it may perform another license renewal intended function. For example: (a) the clearances in a flame arrestor are specifically sized to prevent the propagation of a fire based on the fuel source and configuration of the component being protected; and (b) the flame arrestor could also function as a “cover” to the tank opening, which in effect is a pressure boundary function. Loss of material or cracking could affect the clearances in the flame arrestor. Loss of material or cracking could affect the ability of the flame arrestor to prevent water intrusion into the tank.

Request:

1.
  - a. Justify why cracking is not an applicable aging effect for the stainless steel plant stack monitoring instrument tubing given that chloride contamination of stainless steel components exposed to outdoor air may occur; or
  - b. State the parameters monitored and the inspection methods that will be used to determine whether cracking is present in the stainless steel plant stack monitoring instrument tubing.
2.
  - a. Justify why the aluminum heat exchanger fins performing a heat transfer intended function, as opposed to a pressure boundary intended function, precludes the need to manage these components for cracking; or
  - b. State the parameters monitored and the inspection methods that will be used to determine whether cracking is present for the aluminum heat exchanger fins.
3.
  - a. Provide additional detail to justify why the aluminum flame arrestor does not perform a license renewal intended function; or,
  - b. State the parameters monitored and the inspection methods that will be used to determine whether cracking is present for the aluminum flame arrestor.

### **RAI 3.5.2.2.1-1a**

#### Background:

Section 54.21(a)(3) of the 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation.

In its response letter dated December 7, 2016, to request 1 of RAI 3.5.2.2.1-1 related to further evaluation in LRA Section 3.5.2.2.1, item 4 (corresponding to LRA Table 3.5.1, item 3.5.1-47), the applicant concluded that an increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide and carbonation, is not an aging effect requiring management in above- and below-grade inaccessible areas of Waterford 3 (WF3) concrete structures [Groups 1-5, 7-9] exposed to [GALL Report] “water-flowing” environment [fluid environment in LRA Table 3.0-2]. In request 2 of the response, the applicant revised LRA Section 3.5.2.2.1, item 4, and LRA Table 3.5.1, item 3.5.1-13, accordingly.

#### Issue:

The staff finds that the basis provided in the applicant’s response to request 1 of RAI 3.5.2.2.1-1 is adequate to satisfy the further evaluation criteria of SRP-LR Section 3.5.2.2.1 item 4 for SRP-LR Table 3.5.1, item 47 (for Group 1-5, 7-9 structures) and the corresponding GALL Report AMR items (e.g., item III.A3.TP-67) to support a conclusion that a plant-specific AMP or enhancement is not necessary to manage the related aging effects. However, the response does not support the applicant’s conclusion that the aging effects of increase in porosity and permeability and loss of strength due to leaching of calcium hydroxide and carbonation is not an aging effect requiring management for above- and below-grade inaccessible areas of Groups 1-5, 7-9 concrete structures subject to the GALL Report “water-flowing” environment [exposed to fluid environment in LRA Table 3.0-2]. The staff finds that the aging effect corresponding to SRP-LR Table 3.5.1, item 47, is still applicable because the component(s), material, and environment for it exists at WF3, and therefore should be managed consistent with the provisions in the corresponding GALL Report AMR items. The LRA item 3.5.1-47, therefore, should remain applicable to WF3; however, there are no LRA Table 2 AMR items included in the LRA that correspond to SRP-LR Table 3.5.1, item 47, to indicate that the aging effects will be adequately managed during the period of extended operation. Further, LRA Table 3.5.1, item 3.5.1-47 continues to state that the AMR item is consistent with GALL Report, and the Structures Monitoring Program manages the listed aging effect, which appears to be a reasonable conclusion; however, the staff finds the statement to be contradictory to the conclusion in the RAI response.

Additionally, the response to request 2 of RAI 3.5.2.2.1-1 revised LRA Table 3.5.1, item 3.5.1-13 to delete the following statement in the discussion column “[t]he listed aging effects are addressed by [i]tem 3.5.1-47.” The staff finds the deletion of this statement to be contradictory to the corresponding further evaluation in LRA Section 3.5.2.2.1.9, which states:

“...However, the listed aging effects will be addressed under the concrete foundation for the safety-related shield building and the common rigid reinforced concrete foundation structure for the [nuclear plant island structure] NPIS and further discussed in Section 3.5.2.2.1, [i]tem 4. Therefore, increase in porosity and permeability due to leaching of calcium hydroxide and carbonation are not aging effects requiring management for the WF3 [steel containment vessel] SCV concrete base foundation.”

Therefore, the applicant's response to request 2 of RAI 3.5.2.2.2.1-1 and statement in LRA Section 3.5.2.2.1.9 are also inadequate and contradictory.

Request:

1. Provide information to demonstrate that the aging effects corresponding to SRP-LR Table 3.5.1, items 47 and 13 (and corresponding GALL Report AMR items) will be adequately managed during the period of extended operation consistent with the requirements of 10 CFR 54.21(a)(3). Alternately, provide technical justification for not including Table 2 AMR line items in LRA Tables 3.5.2-1 through 3.5.2-4 (as applicable) for LRA Table 3.5.1, item 3.5.1-47 and item 3.5.1-13 (and corresponding GALL Report line items), which address aging effects that may require management at WF3 during the period of extended operation.
2. Update applicable LRA sections and tables consistent with the response.