Phyllis

From: Clark, Phyllis
Sent: Tuesday, February 14, 2017 4:03 PM
To: 'mchisum@entergy.com'
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Subject: REF: WATERFORD STEAM ELECTRIC STATION, UNIT 3, LICENSE RENEWAL APPLICATION – RAI SET 13 (CAC NO. MF7492)
Attachments: Waterford 3 LRA Final RAI Set 13(2 2017).docx

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 13 (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. Alan Harris and a mutually agreeable date for the response is within 30 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.

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.: **ML17040A538** ***via email**

OFFICE	PM:RPB1:DLR	BC:RPRB:DLR	Acting BC:RPB1:DLR	PM:RPB1:DLR
NAME	PClark	DMorey*	RChazell*	PClark
DATE	1/19/2017	1/19/2017	2/14/2017	2/14/2017

WATERFORD STEAM ELECTRIC STATION, UNIT 3

LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION – SET 13
(CAC NO. MF7492)

RAI 4.3.2-2

Background:

LRA Section 4.3.2.1 discusses the TLAA for non-Class 1 piping and in-line components. The LRA states that for the applicable systems, the projected 60-year thermal cycle counts for these piping and in-line components indicate that 7000 thermal cycles will not be exceeded, and therefore, the non-Class 1 pipe stress calculations are valid for the period of extended operation. The applicant dispositioned this TLAA in accordance with 10 CFR 54.21(c)(1)(i).

Issue:

The LRA did not clarify which thermal transients were used in the fatigue analyses of non-Class 1 piping and in-line components. The staff does not have sufficient information on the thermal transients and their projected cycle counts to confirm that 7000 thermal cycles will not be exceeded and to determine the validity of the applicant's disposition of the TLAA.

Request:

Justify that the 7000 thermal cycle limit will not be exceeded during the period of extended operation such that the stress calculations will remain valid for these non-Class 1 piping and in-line components.

RAI B.1.36-4a

Background:

The RAI response dated December 12, 2016, states that erosion is addressed through preventive maintenance activities on valves ACC-126A and ACC-126B by removing the valves and visually inspecting the valves and piping in accordance with EN-DC-184, Attachment 9.2.[3][4]. The response notes that routine NDE inspections addressed in EN-DC-184, Attachment 9.3 are not needed because the visual inspections of areas with known susceptibility to erosion are implemented through the routine inspections of the valves and piping.

To clarify this information, the response modified LRA Sections A.1.36 and B.1.36 to state that the Service Water Integrity program manages loss of material due to cavitation erosion by periodic visual inspections of susceptible locations.

Issue:

LRA Table 3.3.2-3 includes an aging management review item for carbon steel valve bodies exposed to raw water that are being managed for loss of material due to erosion by the Flow-Accelerated Corrosion program. The discussion in WF3-ME-14-00009, Section 3.1.1 notes that the erosion aging mechanism only applies to select carbon steel valves in the ACC system, and Section 4.4 notes that the Flow-Accelerated Corrosion program monitors locations for wall thickness changes. Since the response clarified that the valves in the ACC system are being managed for erosion by the SWI program, it is unclear to the staff what components in the ACC system are being managed for erosion by the Flow-Accelerated Corrosion program.

Request:

Clarify which specific components in the ACC system are within the scope of the Flow-Accelerated Corrosion program as shown in LRA Table 3.3.2-3 and WF3-ME-14-00009. If the only components are valves ACC-126A and ACC-126B, explain why the current aging management activities described in the initial response need to be augmented by the Flow-Accelerated Corrosion program. In addition, explain why EN-DC-184 Attachment 9.1 does not show any procedural relation with EN-DC-315, Flow-Accelerated Corrosion program similar to the interrelationships shown for procedures EN-DC-316, EN-DC-340, and EN-DC-343.

RAI B.1.36-5a

Background:

The RAI response dated December 12, 2016, states that based on the response to GL 89-13, the provisions of EN-DC-184 step 5.0[6](a)(2) regarding flushing of infrequently used systems did not apply to the ACCW system. However, it also states that the piping from the ACCW system to the emergency feedwater system was identified as needing flushing in accordance with the same step in EN-DC-184 and states that "the enhancement to the SWI program makes these activities part of the program."

Issue:

It is unclear to the staff why Waterford's response to GL 89-13 Action 1 did not include the periodic flushing and flow testing for infrequently used cooling loops as discussed in the generic letter. Although bulk chemistry of the ACCW basins may have been maintained through weekly operation for chemistry testing, it is not clear that this would apply to the portion of the ACCW system piping that supplies cooling water to the emergency feedwater system. In addition, LER 382/1994-004 indicates that controls of the ACCW basin water chemistry were not adequate at some point. Furthermore, although Waterford's current program, EN-DC-184, includes a flushing requirement in step 5.0[6](a)(2), the need for the enhancement *("Revise Service Water Integrity Program procedures to (1) flush redundant, infrequently flowed sections, and stagnant lines…"*) indicates that the current implementing procedures do not meet the current program. This is reiterated through the statement in the RAI response that the enhancement "makes these [flushing] activities part of the program."

Request:

Provide additional bases to show that the current SWI program does not need to include periodic flushing of the of the ACC system piping that supplies cooling water to the emergency feedwater system, such that an enhancement to the SWI program is warranted. If other information is available, discuss additional bases for not including a commitment related to this in Waterford's response to GL 89-13.

RAI 3.3.2.7-2

Background:

Section 54.21(a)(3) of 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 will be maintained consistent with the current licensing basis for the period of extended operation.

LRA Table 3.3.2-7, "Emergency Diesel Generator System," states that the carbon steel tanks exposed to concrete are not susceptible to an aging effect requiring management. This item cites generic note G and plant-specific note 304. Plant-specific note 304 states that "this tank is located indoors and is seated on (not embedded in) concrete."

LR-ISG-2012, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation," states that "although the likelihood of moisture penetrating the interface between these indoor tanks and the concrete surface on which they sit is low, corrosion can occur." Additionally, LR-ISG-2012-02 includes aging management review item 3.3.1-129 for the Aboveground Metallic Tanks AMP which states that steel tanks exposed to various environments, including concrete, may be susceptible to loss of material due to general, pitting, and crevice corrosion.

Issue:

If moisture is allowed to enter the interface between the tank and concrete, the tank bottom may be susceptible to loss of material. Since LRA Table 3.0-1 defines "air-indoor" as air with steam or water leakage, it is unclear to the staff that the tank's bottom surface is not susceptible to general, pitting, or crevice corrosion if there are sources of water near the tank.

Request:

1. If the portion of the tank exposed to concrete is not susceptible to an aging effect requiring management, provide information that:
   a. describes the configuration of the interface between the tank bottom and concrete floor to show that moisture is not likely to enter and cause corrosion, or
   b. confirms that there are no water sources near the tank (e.g., groundwater inleakage, leaking pipes, and components operating at temperatures below the dew point) and that there are no past occurrences where water entered the tank/concrete interface.
2. If the portion of the tank exposed to concrete is susceptible to an aging effect requiring management, provide applicable revised LRA sections.

RAI 4.3.3-2a

Background:

By letter dated October 12, 2016, the staff issued RAI 4.3.3-2, requesting the applicant to provide additional information on its methodology to identify and evaluate plant-specific locations for environmentally-assisted fatigue (EAF). By letter dated December 12, 2016, the applicant responded to RAI 4.3.3-2 stating that its methodology will be based on EPRI Report 1024995, "Environmentally Assisted Fatigue Screening, Process and Technical Basis for Identifying EAF Limiting Locations." The applicant stated that this screening process will determine the "sentinel" locations that will bound and appropriately represent each thermal zone.

Issue:

EPRI Technical Report 1024995 has not been submitted to the NRC for approval and has not been endorsed by the NRC. The applicant did not define a plant-specific methodology and criteria used to select the most limiting locations for EAF. The licensee has not demonstrated that a plant-specific screen methodology has been developed in a manner that conservatively evaluates EAF effects, with the same degree of analytical rigor for all locations, to identify the bounding locations.

The applicant also did not provide information on the plant-specific criteria for each step of the applicant's plant-specific methodology. If evaluating locations on a representative sampling basis, the applicant did not provide the plant-specific criteria that adequately addresses:

1) how components will be grouped together within zones
2) how components will be assessed similarly (e.g., amount of rigor in calculating environmentally-adjusted cumulative usage factors, bounding components of differing materials, use of the same ASME Code Section III, Appendix I fatigue curves)
3) the systematic process to eliminate locations from consideration for EAF

Request:

1. Describe the plant-specific methodology that will be used to determine the limiting locations for EAF.

2. For each step of the methodology, describe and justify the plant-specific criteria, engineering judgement, assumptions, and relevant factors for each step of the process, such as thermal zones, material types, transient complexity, temperature effects, and complexity of the systems (as applicable). Justify that the process is appropriately conservative.

RAI 4.3.1-2a

Background:

In RAI 4.3.1-2 the NRC requested clarification regarding which transients are used for the Leak Before Break (LBB) TLAA and justification that the transients are in the scope of the Fatigue Monitoring Program. The RAI response included a list of transients used in the analysis as well as justification for transients that are not used. The response indicated that the loss of secondary pressure transient is a Level C (Emergency) transient that does not need to be monitored under implementation of applicant's Fatigue Monitoring Program (LRA AMP B.1.11). The applicant stated that this transient does not need to be monitored because the provisions in ASME Code, Section III, sub-paragraph NB-3224.5 allow it to be excluded from any cumulative usage factor analyses for the piping components.

Technical Specifications (TS) Section 6.5.5, "Component Cyclic or Transient Limit," requires the applicant to track any design basis transients for Class 1 piping components, as defined in Technical Requirements Manual (TRM) Section 5.7. Specifically, TS Section 6.5.5 states that the "Component Cyclic or Transient Limit" Program "provides controls to track Technical Requirements Manual Section 5.7 cyclic and transient occurrences to ensure that components are maintained within the design limits."

Issue:

The scope of the exclusion provisions for service loading C transients in ASME Code, Section III, sub-paragraph NB-3224.5 appears to apply only to those cumulative fatigue analyses (i.e., cyclical loading analyses) that may be required to be performed in accordance with the requirements of ASME Code, Section III, sub-paragraph NB 3222.4. The Code does not identify that the provisions in Sub-paragraph NB 3224.5 may be applied to transients that are assumed in LBB analyses approved in the current licensing basis. The reason for this is that LBB analyses are submitted for NRC approval in accordance with the reporting requirements in 10 CFR Part 50, Appendix A, General Design Criterion 4, "*Dynamic Effects,*" and not per any reporting requirements in 10 CFR 50.55a or in Section III of the ASME Boiler and Pressure Vessel Code, Division 1.

In addition, WF3 TRM Section 5.7, "Component Cyclic or Transient Limits," states "the components identified in [TRM Table 5.7-1, "Component Cyclic or Transient Limits,"] are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1." TRM Table 5.7-1 lists the loss of secondary pressure transient as a design basis transient that is required to be monitored in accordance with the requirements in TS Section 6.5.5. Thus, it appears that monitoring this design basis transient would be required by the TS requirements even if the transient would be permitted by ASME Sub-paragraph NB-3224.5 to be excluded from the scope of cumulative usage factor analyses for the Class 1 piping components.

Request:

Provide clarification and justification for the discrepancy that the loss of secondary pressure transient is included in TRM Table 5.7, but is not included in the Fatigue Monitoring Program.

RAI 3.1.1.88-1a

Background:

By letter dated November 7, 2016 (ADAMS Accession No. ML16307A007), the U.S. Nuclear Regulatory Commission (NRC) staff requested additional information from the applicant regarding aging management of loss of material due to boric acid corrosion in steam generator channel heads and tubesheets. In addition, the November 7 letter also informed the licensee that License Renewal Interim Staff Guidance (LR-ISG)-2016-01 was being finalized. By letter dated December 7, 2016 (ADAMS Accession No. ML16342C491), the applicant submitted a response to the request for additional information. On December 7, 2016 (ADAMS Accession No. ML16237A383), the NRC staff also issued License Renewal Interim Staff Guidance (LR-ISG) 2016-01, "Changes to Aging Management Guidance for Various Steam Generator Components."

Issue:

The staff noted the following inconsistencies between the applicant's response and the guidance in LR-ISG-2016-01:

(a) In LR-ISG-2016-01, generic aging lessons learned (GALL) Report AMR items IV.D1.RP-367 and IV.D1.RP-385 were revised to include XI.M19 "Steam Generators" as the program to manage cracking due to primary water stress corrosion cracking (PWSCC) for divider plates and tube-to-tubesheet welds. In License Renewal Application (LRA) Table 3.1.2-4, as revised in the applicant's response, LRA AMR items associated with these GALL Report AMR items do not include the Steam Generator Integrity Program to manage the aging effect. This omission is inconsistent with the applicant's response stating "that the Steam Generator Integrity Program will manage loss of material of the steam generator channel heads and tubesheet and will manage cracking of the steam generator partition plate and tube-to-tubesheet welds."

(b) In conjunction with item (a) above, LRA Table 3.1.1, item 3.1.1-25 does not identify the Steam Generator Integrity Program as an aging management program used to manage cracking due to PWSCC for divider plate assemblies and tube-to-tubesheet welds. In comparison, the revised SRP-LR Table 3.1-1, ID 25 in LR-ISG-2016-01 lists GALL Report AMP XI.M2, "Water Chemistry" and AMP XI.M19, "Steam Generators" as existing aging management programs to manage the aging effect.

(c) LRA Table 3.1.2-4 includes AMR items associated with LRA item 3.1.1-88 to manage loss of material due to pitting and crevice corrosion for steam generator channel heads and tubesheets. However, LRA Table 3.1.2-4 does not identify AMR items to manage loss of material due to boric acid corrosion using the Steam Generator Integrity Program to manage this aging effect. In contrast, LR-ISG-2016 recommends use of SRP-LR Table 3.1-1 ID 127a and GALL Report AMR item IV.D1.R-436a to manage the aging effect for these components. This omission is also inconsistent with the applicant's response stating "that the Steam Generator Integrity Program will manage loss of material of the steam generator channel heads and tubesheet and will manage cracking of the steam generator partition plate and tube-to-tubesheet welds."

(d) In conjunction with item (c) above, LRA Table 3.1.1 does not include SRP-LR Table 3.1-1, ID 127a (as revised in LR-ISG-2016-01) which manages loss of material due to boric

acid corrosion for steam generator channel heads and tubesheets using GALL Report AMPs XI.M19, “Steam Generators” and XI.M2, “Water Chemistry.”

Request:

Please resolve these inconsistencies with LR-ISG-2016-01 or justify their acceptability.

RAI B.1.37-1a

Background:

By letter dated December 7, 2016, the applicant responded to RAI B.1.37-1 to address guidance updates for GALL Report AMP XI.M19, "Steam Generators." In its response, the applicant identified a program enhancement that will revise the Steam Generator Integrity Program to include general visual inspection of the partition plate, channel head, and tubesheet (primary side). The applicant also stated that the LRA is revised to indicate that the Steam Generator Integrity Program will include a general visual inspection of the steam generator tubesheet cladding each time the steam generator manway is opened for inspections.

On December 7, 2016, the NRC staff issued the final License Renewal Interim Staff Guidance (LR-ISG)-2016-01, "Changes to Aging Management Guidance for Various Steam Generator Components" (ADAMS Accession No. ML16237A383), which includes the following guidance:

- Visual inspections on steam generator head internal areas (head interior surfaces, divider plate assemblies, tubesheets (primary side), and tube-to-tubesheet welds) in order to identify signs of cracking or loss of material (e.g., rust stains and distortion of divider plates)

- Frequency of visual inspections: at least every 72 effective full power months or every third refueling outage, whichever results in more frequent inspections

- Implementation of the Electric Power Research Institute (EPRI) steam generator guidelines such as (a) EPRI Report 1022832 (Primary-to-Secondary Leak Guidelines); (b) EPRI Report 1025132 (In-Situ Pressure Test Guidelines); (c) EPRI Report 3002007571 (Integrity Assessment Guidelines); and (d) EPRI Report 3002007572 (Examination Guidelines).

Issue:

It is unclear whether the applicant's Steam Generator Integrity Program is consistent with the guidance discussed above.

Request:

1. Clarify whether the visual inspection frequency for the channel head internal areas (i.e., each time the steam generator manway is opened) meets the guidance in LR-ISG-2016-01 (i.e., at least every 72 effective full power months or every third refueling outage, whichever results in more frequent inspections). If not, justify the inspection frequency.

2. The FSAR supplement (LRA Section A.1.37) and program description (LRA Section B.1.37) do not include the frequency of visual inspections as described in LR-ISG-2016-01. Please justify these omissions.

3. Please discuss the implementation of or plans to implement the EPRI steam generator guidelines by the implementation dates provided by the industry.