



Phyllis

From: Clark, Phyllis
Sent: Wednesday, October 12, 2016 6:20 AM
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Subject: REF: WATERFORD STEAM ELECTRIC STATION, UNIT 3, LICENSE RENEWAL APPLICATION – RAIs SET 4 (TAC NO. MF7492)
Attachments: Waterford 3 LRA Set 4 Enclosure (Final 90 Day Response Time) (10 4 2016)....docx

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

Mr. Michael R. Chisum
Site Vice President

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE WATERFORD STEAM ELECTRIC STATION, UNIT 3, LICENSE RENEWAL APPLICATION – SET 4 (TAC 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 Mr. Alan Harris and a mutually agreeable date for the response is within 90 days from the date of this letter. Some RAIs from the draft version were moved to Sets 2 and 3 due to different response times requested. 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.: **ML16285A340**

***via email**

OFFICE	PM:RPB1:DLR	PM:RPB1:DLR	BC:RASB:DLR	BC:RPB1:DLR	PM:RPB1:DLR
NAME	PClark	J Mitchell*	B Wittick*	YDiaz-Sanabria*	PClark
DATE	10/4/2016	10/6/2016	10/11/2016	10/11/2016	10/11/2016

**WATERFORD STEAM ELECTRIC STATION, UNIT 3
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION – SET 4
(TAC NO. MF7492)**

RAI B.1.16-1

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(s) will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant.

LRA Section B.1.16 states that the Inservice Inspection - IWF Program, with enhancements, is consistent with GALL Report Revision 2 aging management program (AMP) XI.S3, "ASME Section XI, Subsection IWF." The "detection of aging effects" program element in GALL Report AMP XI.S3 recommends that, for high-strength structural bolting (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter (hereafter referred to as high-strength bolting), volumetric examinations should be performed in addition to VT-3 visual examinations to detect cracking. These volumetric examinations may be waived with adequate plant-specific justification. Additionally, the GALL Report AMP XI.S3 for aging management of high-strength structural bolting recommends, in the:

- "scope of program," program element, the inclusion of high-strength structural bolting
- "preventive actions," program element, (1) the use of bolting material that has an actual measured yield strength less than 150 ksi and (2) prohibition of the use of molybdenum disulfide (MoS_2) as a thread lubricant due to its potential contribution to stress corrosion cracking (SCC)
- "parameters monitored or inspected," program element, monitoring of high-strength structural bolting susceptible to SCC, for cracking

Issue:

LRA Section B.1.16 states:

[p]lant procedures prohibit the use of lubricants containing molybdenum disulfide. Since the use of this type of lubricant is prohibited in plant procedures and plant procedures provide the technical guidance for installation requirements [...], stress corrosion cracking for high-strength structural bolting material, i.e., ASTM A325 and A490, is not plausible.

While the GALL Report specifically states that the use of MoS_2 lubricants as a lubricant is a potential contributor to SCC in high strength bolts, the GALL Report does not limit MoS_2 thread lubricant as the only contributor to the aging mechanism for SCC in the

above-mentioned high strength bolts. Therefore, a justification to waive volumetric examinations of high-strength bolts based solely on the prohibition of MoS₂ lubricants does not fully account for high-strength bolting in environments conducive to SCC. Therefore, the staff has not determined that there is adequate basis to waive volumetric examination of high-strength structural bolting (actual measured yield strength of 150 ksi) in sizes greater than 1 inch nominal diameter.

In addition, during the audit, the staff noted that the “preventive actions” program element in the LRA program basis document does not discuss whether the program will specify the use of bolting material that has an actual measured yield strength less than 150 ksi (1,034 MPa). For this reason, it is not clear whether the program will prevent future use of high strength bolting material (actual measured yield strength greater than or equal to 150 ksi or 1,034 MPa) in sizes greater than 1 inch nominal diameter. Also, the program does not account for how aging management would be accomplished if high strength bolting is used in the future (if it is used in areas that are conducive to SCC) as recommended by the GALL Report AMP XI.S3, for supplemental volumetric examination.

Request:

1. State whether high strength structural bolts (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch diameter are included within the scope of the LRA AMP B1.16, Inservice Inspection-IWF program. If so, state how the recommendations for managing degradation of high-strength bolts (including selection of bolting material less than 150 ksi) described in the “preventive actions,” “parameters monitored or inspected,” and “detection of aging effects” program elements will be implemented for the Inservice Inspection-IWF Program.
2. If criteria other than those described in the GALL Report are used, provide the basis to justify the adequacy of any proposed exception to manage aging effects on high strength bolting (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter for IWF supports, or
3. Provide additional justification to waive the volumetric examinations that the GALL Report recommends be performed in addition to VT-3 visual examinations to detect cracking of high-strength structural bolting.

RAI B.1.28-2

Background:

LRA Section B.1.28, "One-Time Inspection," notes that the program will be used to verify that change in material properties, loss of material and cracking are not occurring for reinforced concrete portions of the circulating water intake piping exposed to raw water.

During the audit, the staff reviewed a summary report prepared by Pure Technologies US, Inc. of a previous inspection conducted on similar concrete piping in a 132-inch cooling water discharge line. The summary report of the Pure Technologies US, Inc. inspection noted that a majority of the pipe joints exhibited separation and/or spalling and recommended all pipeline joints be cleaned and mortared to prevent corrosion of the joint steel and potential leaks. The report also recommended a re-inspection of the pipeline in approximately five years.

The "Program Description" and "Scope of Program" of GALL Report AMP XI.M32 "One-Time Inspection" states, in part: "This program cannot be used for structures or components with known age-related degradation mechanisms or when the environment in the period of extended operation is not expected to be equivalent to that in the prior 40 years. Periodic inspections should be proposed in these cases."

Issue:

The GALL Report includes AMR line items for concrete piping exposed to raw water and recommends XI.M20, "Open-Cycle Cooling Water System," for managing the effects of aging. GALL Report AMP XI.M20 recommends periodic inspections. In addition, the Pure Technologies report recommended a follow-up inspection of similar piping in approximately five years.

Based on the GALL Report recommendation in AMPs XI.M20 and XI.M32 that periodic inspections should be proposed for structures or components with known age-related degradation mechanisms, and the recommendations in the Pure Technologies report for addressing observed degradation mechanism(s), it is unclear to the staff why a one-time inspection is appropriate to manage the effects of aging for concrete piping in the circulating water system. The staff also needs additional information to determine whether the applicant's operating experience supports the sufficiency of the LRA AMP.

Request:

Explain why it is appropriate to manage the effects of aging on concrete portions of the circulating water intake piping exposed to raw water via the one-time inspection program. The response should consider the guidance in the GALL Report AMPs for similar material and environment combinations and the operating experience described in the Pure Technologies report, specifically the recommendation to re-inspect the piping.

RAI B.1.38-1

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(s) will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant.

The “parameters monitored or inspected,” and “detection of aging effects” program elements of GALL Report AMP XI.S6, “Structures Monitoring,” recommends that high strength (actual measured yield strength greater than or equal to 150 ksi) structural bolts in sizes greater than 1 inch in diameter to be monitored for stress corrosion cracking (SCC). The GALL Report also recommends that visual inspections be supplemented with volumetric or surface examinations to detect cracking for this type of bolts.

LRA Section B.1.38, “Structures Monitoring,” states that the Structures Monitoring Program is an existing program, with enhancements, that will be consistent with GALL Report AMP XI.S6. The staff notes that LRA Section B.1.38 does not provide an enhancement to the “parameters monitored or inspected,” and/or “detection of aging effects” program elements to address the aging effects of SCC in high strength structural bolts. LRA Table 3.5.1, item 68, states, in part, that “since molybdenum disulfide thread lubricants are not used at WF3, for structural bolting applications, SCC of high strength structural bolting is not an aging effect requiring management at WF3.”

During the AMP audit, the staff reviewed the applicant’s “Aging Management Program Evaluation Report Civil/Structural” (AMPER), implementing procedures, plant structural specifications and drawings, and noted the following:

- The applicant excluded the use of supplemental examinations in high strength structural bolts and states, in part, that “since a thread lubricant containing molybdenum disulfide is not used at WF3, SCC of structural bolting is not plausible, inspections are not required to be supplemented with volumetric or surface examinations.” (AMPER Section 3.4.2.b)
- Plant structural specification LOU 1564.723, “Structural Steel Seismic I & II,” states, in part, that “field connections shall be friction type joints, assembled with 7/8” diameter high-strength bolts, unless otherwise noted on drawings...”
- Plant drawings notes, in general, stated that “field connections, unless noted, shall be ASTM A325 high strength bolted friction type connections...”
- Structural drawings reviewed by the staff indicates the use of several types of bolts (including A325 and A193 B7 types bolts), and bolts with diameter greater than 1 inch.

Issue:

It is not clear to the staff if “parameters monitored or inspected,” and “detection of aging effects” program elements of the Structures Monitoring Program is consistent with the GALL Report recommendation because:

1. The applicant's Structures Monitoring Program does not provide sufficient justification for not managing the aging effects of SCC in high strength structural bolting, because the GALL Report does not credit the molybdenum disulfide thread lubricant as the only contributor to the aging mechanism of SCC in high strength bolts.
2. It is not clear to the staff (1) whether high strength structural bolts greater than 1 inch in diameter are used or not in structural applications, or (2) how supplemental examinations are performed for these bolts because the plant's structural specifications and drawings do not preclude the use of high strength structural bolts with diameter greater than 1 inch when specified or noted as such in the drawing details.

Request:

1. State whether or not there are high-strength structural bolts (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch diameter used in structural applications. Note: consider actual bolts being specified in the plant's structural drawing details in addition to generic drawing notes.
2. If high-strength structural bolts (actual measured yield strength greater than or equal to 150 ksi) in sizes greater than 1 inch diameter are used in structural applications, state whether and how the recommendations for managing degradation of high-strength bolts described in the "parameters monitored or inspected," and "detection of aging effects" of the GALL Report AMP XI.S6 will be implemented for the Structures Monitoring Program. Otherwise, provide adequate technical justification for the exception taken to the GALL Report AMP recommendation.
3. Update the LRA and FSAR supplement, as appropriate, to be consistent with the response to the above requests.

RAI 3.3.2.3.15.29-1

Background:

LRA Table 3.3.2-15-29, "Radiation Monitoring System, Nonsafety-Related Components Affecting Safety-Related Systems," states that aluminum filter housing exposed to waste water will be managed for loss of material using the Internal Surfaces In Miscellaneous Piping and Ducting Components program.

Issue:

Stress corrosion cracking (SCC) is a form of environmentally assisted cracking which is known to occur in high and moderate strength aluminum alloys. Halide concentrations should generally be considered high enough to facilitate cracking due to SCC of aluminum alloys in waste water unless demonstrated otherwise; however, depending on the specific aluminum alloy used for the filter housings, the aging effect of cracking due to SCC may be applicable. Without knowledge of the specific aluminum alloy, it is unclear to the staff if cracking due to SCC is an applicable aging effect for this material/environment combination.

Request:

Provide the basis for why cracking due to SCC is not an applicable aging effect for aluminum filter housing exposed to waste water in the "Radiation Monitoring System, Nonsafety Related Components Affecting Safety Related" system.