

# DRAFT – UNVERIFIED INFORMATION

## Question

RAI B.1.40-5 (Service Water Integrity)

## Background

LRA Table 3.5.2-2, "Water-Control Structures," indicates that the cooling tower tile fill for both the standby service water and the service water cooling systems do not have aging effects requiring management and, consequently, do not need an aging management program. Plant-specific operating experience report CR-RBS-2008-05043 discusses broken pieces of cooling tower fill material in the collector pots of the circulating water system. During the aging management program audit, RBS personnel stated that the circulating water system cooling tower fill is similar to the standby service water fill material in LRA Table 3.5.2-2. In addition, CR-RBS-2006-03376 discusses the failure of the fill material support members in the service water cooling system cooling tower Cell D that resulted in approximately 30 percent of the fill material falling into the associated cooling tower basin. According to the condition report, a contributing factor of the failure was an overload condition caused by fouling of the fill material. Several corrective actions from this condition report included the development of a periodic fill inspection program.

## Issue

Based on plant-specific operating experience reports CR-RBS-2006-03376 and CR-RBS-2008-05043, documenting degradation of the fill material (either cracking or fouling that leads to an increase in weight), it is not clear to the staff why there are no aging effects requiring management for the fill material in the cooling towers for the standby service water and service water cooling systems.

## Request

Given the plant-specific operating experience described in CR-RBS-2006-03376 and CR-RBS-2008-05043, associated with the fill material in the cooling towers, state the basis for why there are no applicable aging effects. Alternatively, state how the LRA will be revised to address the applicable aging effects.

## Response

The cooling tower fill material identified in CR-RBS-2008-05043 is associated with the circulating water cooling towers, which are not subject to aging management review.

The service water cooling system (SWC) cooling tower fill material is the subject of condition report CR-RBS-2006-03376. The cause of the fill material failure was not the effects of aging, but was a less than adequate design of the fill support systems. The failure was not in the fill material. According to the apparent cause evaluation, the fill fell due to failure of the fiber-reinforced plastic (FRP) bearing plate supporting the fill support beam. This bearing plate design has been replaced with a stainless steel design. Additionally, a thicker FRP support beam design was incorporated into the fill support system.

A contributing cause identified in the evaluation under CR-RBS-2006-03376 was an increase in the weight of the fill material due to fouling. However, the increased weight would not have caused the failure if the fill support system design had been adequate. Nevertheless, River Bend Station license renewal application Section 3.5.2.1.2 and Table 3.5.2-2 are revised to show fouling as an aging effect for fill material and to indicate that the Structures Monitoring Program will manage the aging effect.

Because the fill material condition remained acceptable following the failure, no additional aging effects requiring management have been identified for the fill material identified in LRA Table 3.5.2-2.

DRAFT – UNVERIFIED INFORMATION

## DRAFT – UNVERIFIED INFORMATION

***River Bend Station (RBS) previously responded to RAI B.1.40-5 by letter dated March 8, 2018 (RBG-47834). The response to RAI B.1.40-5 is supplemented to include the following additional clarifications discussed with the NRC during a public telephone conference call held on April 10, 2018.***

### **Request**

- 1) Provide information to establish that the aging effects identified for the fill material in the circulating water cooling tower fill are not applicable to the fill material in the standby service water cooling tower.
- 2) Clarify how the visual inspections conducted by the Structures Monitoring Program will adequately manage the increase in weight due to fouling of the cooling tower fill material. Include information to establish that the related conditions and operating experience at the plant are bounded by the conditions and operating experience for which the Structures Monitoring Program was evaluated.

### **Response**

1. River Bend Station (RBS) has determined through review of site documentation (e.g., specifications, drawings) that the conditions identified in RBS condition report CR-RBS-2008-05043 for the circulating water system (CWS) cooling tower fill material are not applicable to the standby service water (SSW) fill material and its support system. The design of the SSW fill support system is not the same as the design of the fill support system of the CWS cooling tower. The fill material of the SSW is vitrified clay tile with fill support lintels made from cast iron material. Additionally, these components are seismically supported on reinforced concrete beams and columns. The CWS tower fill material is polyvinyl chloride (PVC) supported on concrete fill beams that are adequately sized and spaced to prevent sagging of the fill material. It is not designed to withstand a seismic event. The design of the SSW fill support system is robust and the tower operates for only approximately 1% or less of the time for normal operational testing during refueling outages. Improved water chemistry controls have also been instituted, which reduces the potential for fouling.
2. The RBS license renewal application (LRA) program A.1.41 “Structures Monitoring Program” (SMP) will be revised to include periodic visual examinations that can identify fouling, if any, of the fill material. The SMP will be enhanced to include ongoing monitoring activities for the service water cooling (SWC) tower fill material. This additional monitoring includes periodic visual examination of a sample coupon of similar material placed in the SWC cooling tower in an area that is subject to the same environment as the fill material. The SMP will assess the condition of the sample material to determine if fouling of the fill material is occurring. The acceptance criteria will be the absence of fouling due to biological growth on the surface of the fill material. Visual examination results that identify fouling will be entered into the corrective action program. RBS personnel will evaluate the as-found condition and determine the need for additional corrective actions, if any. Supplemental visual examination or analysis of fouling will be conducted, as necessary, to determine if the fouling could degrade the fill support system.

Monitoring the SWC cooling tower fill through inspection of the sample coupon will be performed at a frequency of once every two years, as defined above and in the enhancement. Based upon the redesign of the SWC cooling tower fill material support system and improved water chemistry, failure of the fill material due to fouling is not expected. The Structures Monitoring Program with enhancements will adequately

DRAFT – UNVERIFIED INFORMATION

# DRAFT – UNVERIFIED INFORMATION

manage fouling by visual inspection of the SWC cooling tower fill material such that it can be identified and corrected prior to a loss of function.

LRA revisions follow. Additions are underlined and deletions are lined through.

## 3.5.2.1.2 Water-Control Structures

### **Aging Effects Requiring Management**

The following aging effects associated with water-control structure components require management.

- Cracking
- Cracking and distortion
- Fouling
- Increase in porosity and permeability
- Loss of bond
- Loss of material
- Loss of strength

**Table 3.5.2-2: Water-Control Structures**

Structure and/or Component or Commodity	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Cooling tower tile fill (SSW and SWC cooling tower)	HS, SNS	Ceramic and clay tile	Exposed to fluid environment	<u>None</u> <u>Fouling</u>	<u>None</u> <u>Structures Monitoring</u>	--	--	J
Cooling tower tile fill (SSW and SWC cooling tower)	HS, SNS	Polyvinyl chloride	Exposed to fluid environment	<u>None</u> <u>Fouling</u>	<u>None</u> <u>Structures Monitoring</u>	--	--	J

### **A.1.41 Structures Monitoring**

The Structures Monitoring Program will be enhanced as follows.

- Revise plant procedures to include inspections of the service water cooling system cooling tower fill material. A sample coupon of similar material shall be provided that will indicate potential fouling. The periodic visual inspection at a frequency of once every two years is intended to detect whether fouling is occurring.
- Acceptance criteria for the inspections of cooling tower fill will be the absence of fouling.
- Conditions of cooling tower fill that do not meet the acceptance criteria will be entered into the corrective action program for evaluation.

# DRAFT – UNVERIFIED INFORMATION

## B.1.41 Structures Monitoring

### Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Element Affected	Enhancement
4. Detection of Aging Effects	<p>Revise plant procedures to include the following:</p> <ul style="list-style-type: none"><li>• Visual inspection of elastomeric material should be supplemented by feel or touch to detect hardening if the intended function of the elastomeric material is suspect. Include instructions to augment the visual examination of elastomeric material with physical manipulation of at least 10 percent of available surface area.</li><li>• Inspection of submerged structures at the same inspection interval and limitations as the other structures in the program.</li><li>• Sampling and chemical analysis of ground water at least once every five years. The program owner will review the results and evaluate any anomalies and perform trending of the results.</li><li>• <u>Revise plant procedures to include inspections of the service water cooling system cooling tower fill material. A sample coupon of similar material shall be provided that will indicate potential fouling. The periodic visual inspection at a frequency of once every two years is intended to detect whether fouling is occurring.</u></li></ul>
<u>6. Acceptance Criteria</u>	<u>Acceptance criteria for the inspections of cooling tower fill will be the absence of fouling.</u>
<u>7. Corrective Actions</u>	<u>Conditions of cooling tower fill that do not meet the acceptance criteria will be entered into the corrective action program for evaluation.</u>

# DRAFT – UNVERIFIED INFORMATION

## A.4 LICENSE RENEWAL COMMITMENT LIST

<u>No.</u>	<u>Program or Activity</u>	<u>Commitment</u>	<u>Implementation Schedule</u>	<u>Source (Letter Number)</u>
28	Structures Monitoring	Enhance the Structures Monitoring Program as described in LRA Section A.1.41.	Prior to February 28, 2025, or the end of the last refueling outage prior to August 29, 2025, whichever is later.	RBG-47735 RBG-47842 RBG-47860

DRAFT