Question

RAI B.1.43-2 (Closed Treated Water Systems)

Background

For the "detection of aging effects" program element, Section 4.13 of RBS-EP-15-00007 states that the Water Chemistry – Closed Treated Water Systems program manages the effects of aging in an environment of treated water. For the vacuum release accumulators in LRA Table 3.3.2-3 (TK1A and TK1B on drawing PID-09-10F), the internal environment is listed as treated water with the aging management program listed as Water Chemistry Control – Closed Treated Water Systems.

Issue

Based on the information shown on drawing PID-09-10F, "System 118 Service Water Normal," the accumulators and portions of the associated piping do not appear to have an internal environment of treated water because these components are supplied by the compressed air system. It is not clear to the staff whether these components have a treated water internal environment and whether the aging affects for these components will be managed by the Water Chemistry Control – Closed Treated Water Systems program as listed in LRA Table 3.3.2-3.

In addition, based on information in Standby Service Water Quarterly Valve Operability Test procedures (STP-256-6305 and STP-256-6306 for valves SOV-522A, B, C, D and SOV-523A, B, C, D), air is periodically introduced into portions of the piping as part of the vacuum release solenoid valve function verification. Based on the piping configurations in various isometric drawings, it appears that air cannot be vented in some portions of the associated piping, between the check valves and the treated water source. Consequently, there will be an air water interface in a portion of the pipe, with the air being periodically replenished, similar to the situation in NRC Information Notice 2013 06, "Corrosion in Fire Protection Piping Due to Air and Water Interaction." It is not clear to the staff that the Water Chemistry Control – Closed Treated Water Systems program activities account for this situation.

Request

1. Clarify the information provided in LRA Table 3.3.2-3 (TK1A and TK1B on drawing PID-09-10F), with regard to the internal environment of the vacuum release accumulators and portions of the associated piping, and whether aging effects of these components will be managed by the Water Chemistry Control – Closed Treated Water Systems program.
2. Provide additional information to show that the activities in the Water Chemistry Control – Closed Treated Water Systems adequately account for the potential air-water interface in the portions of the piping that cannot be vented between the check valves and the treated water source (associated with SOV-522A, B, C, D, and SOV 523A, B, C, D).

Response

A previous response to RAI B.1.43-2 was submitted in letter RBG-47834, dated March 8, 2018. The following response is the same as the response in letter RBG-47834 except additional information has been provided regarding the internal environments associated with the auxiliary building vacuum release piping and valves. In addition, a change is made to LRA Table 3.3.2-18-11. The following response supersedes the previous response submitted in letter RBG-

47834.

1. LRA Table 3.3.2-3 vacuum release accumulators (TK1A and TK1B on drawing PID-09-10F) contain instrument air. The LRA is revised to identify that the Compressed Air Monitoring Program manages the aging effects for the internal surfaces of the vacuum release accumulators and associated piping.

2. Normally closed SOV-522A, B, C, and D are located downstream of the two instrument air accumulators. If necessary, the service water system in the containment relies on this instrument air to release a vacuum in the system piping.

   Normally closed SOV-523A, B, C, and D are not associated with accumulators containing instrument air. If necessary to release system vacuum, the valves open to admit air from the auxiliary building into the service water system.

   The RAI Issue discussion refers to NRC Information Notice 2013-06, "Corrosion in Fire Protection Piping Due to Air and Water Interaction". This information notice discusses fire water systems which may contain highly oxygenated, raw, untreated water. The RBS service water system contains demineralized water treated with sodium nitrite and molybdate as corrosion inhibitors. Because of this piping internal environment, significant corrosion is not expected.

   To confirm the insignificance of corrosion in the subject piping, inspections will verify that unacceptable degradation is not occurring. For the portions of the containment piping that cannot be vented between the check valves and the treated water source, the One-Time Inspection Program will perform a volumetric inspection of a piping segment associated with SOV-522A, B, C, or D.

   The auxiliary building piping between the solenoid valves (SOV-523A, B, C, and D) and the rest of the service water system is exposed to treated water internally. A vacuum would only be created in the service water piping under emergency conditions and air would not be drawn into the auxiliary building piping during valve stroke testing. Unlike with the similar containment building piping, there are no air accumulators supplying the auxiliary building piping. Thus, there is no motive force for air to enter the auxiliary building service water piping during valve stroke testing. Nevertheless, for conservatism, the auxiliary building piping is included in the Table 3.3.2-3 line item, below, for carbon steel piping exposed to treated water and the One-Time Inspection Program will perform a volumetric inspection of a piping segment associated with SOV-523A, B, C, or D.

   Normally closed SOV-523A, B, C, and D have stainless steel valve bodies. Since portions of the stainless steel valve bodies exposed to an air-indoor internal environment are not susceptible to aging effects, the LRA Table 3.3.2-3 line item for stainless steel valve body exposed to a treated water internal environment is sufficient to address aging effects for the valves.

   The carbon steel piping out-board of valves SOV-523A, B, C, and D is highlighted in yellow on LRA drawing PID-09-10F, which indicates it is evaluated in LRA Section 2.3.3.18, "Auxiliary Systems in

Scope for 10 CFR 54.4(a)(2)." A line item is added to Table 3.3.2-18-11, "Service Water – Standby System, Nonsafety-Related Components Affecting Safety-Related Systems," to provide aging management review results for this piping.

The changes to LRA Table 3.3.2-3 and the associated notes, Table 3.3.2-18-11, Table 3.3.1, Section A.1.32, and B.1.32 follow with additions underlined.

Table 3.3.2-3: Service Water System

Component Type	Intended Function	Material	Environ-ment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Item	Table 1 Item	Notes
Accumulator	Pressure boundary	Carbon steel	Condens ation (int)	Loss of material	Compressed Air Monitoring	VII.D.A-26	3.3.1-55	B
Piping	Pressure boundary	Carbon steel	Condens-ation (int)	Loss of material	Compressed Air Monitoring	VII.D.A-26	3.3.1-55	B
Piping	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	One-Time Inspection	VII.C2.AP-202	3.3.1-45	A, 309

Notes for Tables 3.3.2-1 through 3.3.2-18-26

Plant-Specific Notes

309. The One-Time Inspection Program will confirm the insignificance of corrosion for service water system containment and auxiliary building vacuum release piping that may have an air/water interface. The One-Time Inspection Program will use NDE techniques to inspect this piping for loss of material.

Table 3.3.2-18-11: Service Water – Standby System, Nonsafety-Related Components Affecting Safety-Related Systems

Component Type	Intended Function	Material	Environ ment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	External Surfaces Monitoring	V.D2.E-29	3.2.1-44	E

Table 3.3.1: Auxiliary Systems					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-45	Steel piping, piping components, and piping elements; tanks exposed to closed-cycle cooling water	Loss of material due to general, pitting, and crevice corrosion	Chapter XI.M21A, "Closed Treated Water Systems"	No	Consistent with NUREG-1801. Loss of material for steel components exposed to closed-cycle cooling water is managed by the Water Chemistry Control – Closed Treated Water Systems Program. The One-Time Inspection Program will confirm the insignificance of corrosion for service water system containment and auxiliary building vacuum release piping that may have an air/water interface. The One-Time Inspection Program will use NDE techniques to inspect this piping for loss of material.

A.1.32 One-Time Inspection

The program will include activities to verify effectiveness of aging management programs and activities to confirm the insignificance of aging effects as described below:

A representative sample of service water system containment and auxiliary building vacuum release piping that cannot be vented between the check valves and the treated water source.	One-time inspection will confirm that loss of material is not occurring or is occurring so slowly that the aging effect will not affect the component intended function during the period of extended operation.

Inspections will be performed within the 10 years prior to the period of extended operation.

B.1.32 ONE-TIME INSPECTION

The program will include activities to verify effectiveness of aging management programs and activities to confirm the insignificance of aging effects as described below.

A representative sample of service water system containment and auxiliary building vacuum release piping that cannot be vented between the check valves and the treated water source.	One-time inspection will confirm that loss of material is not occurring or is occurring so slowly that the aging effect will not affect the component intended function during the period of extended operation.

Inspections will be performed within the 10 years prior to the period of extended operation.