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54.17

NLS2009055
July 29, 2009

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to Request for Additional Information for License Renewal Application Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:
1. Letter from Tam Tran, U.S. Nuclear Regulatory Commission, to Stewart B. Minahan, Nebraska Public Power District, dated June 29, 2009, "Request for Additional Information for the Review of the Cooper Nuclear Station License Renewal Application (TAC No. MD9763 and MD9737)."
2. Letter from Stewart B. Minahan, Nebraska Public Power District, to U.S. Nuclear Regulatory Commission, dated September 24, 2008, "License Renewal Application."

Dear Sir or Madam:

The purpose of this letter is for the Nebraska Public Power District to respond to the Nuclear Regulatory Commission Request for Additional Information (RAI) (Reference 1) regarding the Cooper Nuclear Station License Renewal Application (LRA). These responses are provided in Attachment 1. Certain changes to the LRA (Reference 2) have been made to reflect these RAI responses and other clarifications. These changes are provided in Attachment 2.

Should you have any questions regarding this submittal, please contact David Bremer, License Renewal Project Manager, at (402) 825-5673.

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NRR

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I declare under penalty of perjury that the foregoing is true and correct.

Executed on 7/29/09
(Date)

Sincerely,

Stewart B. Minahan
Vice President – Nuclear and
Chief Nuclear Officer

/wv

Attachments

cc: Regional Administrator w/ attachments
USNRC - Region IV

Cooper Project Manager w/ attachments
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachments
USNRC - CNS

Nebraska Health and Human Services w/ attachments
Department of Regulation and Licensure

NPG Distribution w/ attachments

CNS Records w/ attachments

Attachment 1

Response to Request for Additional Information
for License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

The Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) regarding the License Renewal Application is shown in italics. The Nebraska Public Power District's (NPPD) response to each RAI is shown in block font.

<u>NRC Request</u>: *RAI 4.2-3*

Data in Table 4.2-3 Cooper Nuclear Station (CNS) Equivalent Margin Analysis

The license renewal application (LRA) states in Table 4.2-3, "CNS Equivalent Margin Analysis for Lower-Intermediate Circumferential Weld (1-240) for 54 EFPY," that the 54 EFPY fluence at ¼ of the thickness of the RPV wall (¼ T) for the limiting beltline weld is 1.07E+17 n/cm2 (E > 1.0 MeV). Tables 4.2-2 and 4.2-1 show a value of 1.07E+18 n/cm2 for the ¼ T fluence at 54 EFPY for the same weld. Please confirm that this entry into Table 4.2-3 is a typographical error and should read 1.07E+18 n/cm2 (E > 1.0 MeV) or explain the difference between the values in the tables mentioned.

<u>NPPD Response</u>:

The 54 EFPY ¼ T fluence for weld 1-240 in LRA Table 4.2-3 is a typographical error. The fluence should be 1.07E18 rather than 1.07E17. This change will make LRA Table 4.2-3 consistent with the other LRA tables mentioned in the RAI (see Attachment 2, Change 31).

The Regulatory Guide 1.99 predicted upper-shelf energy (USE) reduction for a weld with a copper content of 0.183% and a fluence of 1.07E17 is only 11% while the predicted USE reduction for the same weld with a fluence of 1.07E18 is 19% as stated in LRA Table 4.2-3; thus the correct fluence was used in the analysis and the error in the table is only typographical.

<u>NRC Request</u>: *RAI B.1.22-3*

<u>Background</u>
LRA Section B.1.22, "Metal-Enclosed Bus," states that this is a new program implemented consistent with GALL Report Aging Management Program (AMP) XI.E4, "Metal Enclosed Bus," with an exception to inspect the external portions of the bus under GALL Report AMP XI.E4. GALL Report AMP XI.E4, Program Element "Detection of Aging Effects," specify inspection frequencies for testing and alternative visual inspection of metal-enclosed bus bolted connections. NUREG-1800 Revision 1, Table 3.6.2, "FSAR Supplement for Aging Management

of Electrical and Instrumentation and Control Systems," also identifies the testing and alternative visual inspection test frequencies specified by GALL Report AMP XI.E4.

Issue

LRA Appendix A, Section A.1.1.22, "Metal-Enclosed Bus Inspection Program," USAR supplement for AMP B.1.22 does not specify the frequency of inspection as described in GALL AMP XI.E4 and NUREG-1800 Revision 1, Table 3.6.2.

Request

Revise LRA Appendix A, Section A.1.1.22 to include the testing and alternative visual inspection test frequencies as identified by GALL Report AMP XI.E4 and NUREG-1800 Revision 1, Table 3.6.2, "FSAR Supplement for Aging Management of Electrical and Instrumentation and Control Systems, Metal Enclosed Bus Program."

NPPD Response:

CNS LRA Section A.1.1.22 states the CNS Metal Enclosed Bus Program will be implemented consistent with NUREG-1801, Section XI.E4, which specifies the applicable test and inspection frequencies. However, the CNS program includes an exception to add the inspections for the metal enclosure assemblies. Section A.1.1.22 of the LRA is therefore revised to state the frequency for this addition to the Metal Enclosed Bus Program consistent with the response to RAI B.1.22-1[1] (see Attachment 2, Change 33).

NRC Request: *RAI B.1.13-3*

Background

LRA Section B.1.23 [sic], *"Environmental Qualification (EQ) of Electric Components," states that this is an existing program implemented consistent with GALL Report AMP X.E1, "Environmental Qualification (EQ) of Electric Components," GALL Report AMP X.E1 and LRA Section B.1.13 program descriptions include EQ reanalysis attributes. LRA Chapter 4.0, Time-Limited Aging Analysis, Section 4.4, "Environmental Qualification (EQ) of Electric Equipment," also states that the EQ program is an existing program that is consistent with GALL Report AMP X.E1 and that the aging effects associated with TLAA for EQ of electric equipment will be managed for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(iii). NUREG-1800 Revision 1, Table 4.4.2, "Examples of FSAR Supplement for Environmental Qualification of Electrical Equipment TLAA Evaluation," also shows that an EQ program implementation that is in accordance with 10 CFR 54.21(c)(1)(iii) includes reanalysis attributes in the FSAR supplement description.*

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[1] NLS2009040, Stewart B. Minahan to USNRC, "Response to Request for Additional Information for License Renewal Application – Aging Management Programs," June 15, 2009 (ADAMS Accession Number ML091690050).

Issue
The applicant's USAR supplements included in LRA Appendix A, Section A.1.1.13, "Environmental Qualification (EQ) of Electric Components Program," and Section A.1.2.3, "Environmental Qualification of Electrical Components," do not include reanalysis attributes as shown in LRA Section B.1.23, GALL Report AMP X.E1 and SRP Table 4.4.2.

Request
Provide the reanalysis attributes as per NUREG-1800 Revision 1, "Examples of FSAR Supplement for Environmental Qualification of Electrical Equipment TLAA Evaluation," and GALL Report AMP X.E1.

NPPD Response:

Based on a review of the guidance in NUREG-1800, NPPD concurs that a clarification is appropriate for LRA Section A.1.1.13. CNS LRA Section A.1.2.3 credits the EQ Program to manage the effects of aging on components associated with EQ time-limited aging analyses. The key EQ programmatic aspects (including reanalysis attributes) are most appropriately addressed in LRA Section A.1.1.13.

The CNS LRA is amended to discuss reanalysis attributes in CNS LRA Section A.1.1.13 (see Attachment 2, Change 32).

NRC Request: *RAI 2.3.2.1-1*

Residual Heat Removal

LRA pages 11 and 12 read:

"Appropriate LRA drawings for the systems were reviewed to identify safety-to-nonsafety interfaces. Nonsafety-related components connected to safety-related components were included to the first seismic anchor or base-mounted component. A seismic anchor is defined as hardware or structures that, as required by the analysis, physically restrain forces and moments in three orthogonal directions. Scope was typically determined by the bounding approach, which included piping beyond the safety-to-nonsafety interface up to a base-mounted component, flexible connection, or the end of a piping run (such as a vent or drain line). Also, piping isometrics were used to identify seismic anchors when required to establish scope boundary."

On LRA-2040-SH01 in zones B/C/D-8/9/10 valve RHR-27 is highlighted/color coded red for reactor coolant pressure boundary while the downstream pipe and valve RHR-28 are highlighted yellow (non-safety related affecting safety related). RHR-29 and RHR-30 are similarly highlighted. However, RHR-24 and RHR-25 are both highlighted in red while the piping downstream of RHR-25 is highlighted yellow. In zone C-9 drain valve RHR-297 downstream *piping is highlighted red as being in scope as safety related. The drain lines downstream of most other drain valves are highlighted in yellow as being in scope as non-safety related affecting safety related. Please explain the scoping basis (safety related reactor coolant system pressure boundary or non-safety related affecting safety related) for inclusion of these and similar drain/vent/test connection valves and downstream piping?*

NPPD Response:

The items highlighted on LRA drawing LRA-2040-SH01 indicate the components that are subject to aging management review. Those highlighted in red are safety-related residual heat removal (RHR) system ASME Class 1 components evaluated as part of the aging management review of the reactor coolant system pressure boundary. Therefore, these components are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(1).

The nonsafety-related drain piping and valves highlighted in yellow are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2).

The drain piping downstream of valve RHR-297 to the floor drain shown on drawing LRA-2040-SH01, should be highlighted in yellow instead of red because it is nonsafety-related. The piping is evaluated as component type 'piping' in LRA Table 3.2.2-8-1, "Residual Heat Removal System [10 CFR 54.4(a)(2)]."

NRC Request: *RAI 2.3.2.1-2*

Residual Heat Removal

Drawing LRA-2040-SH02 shows in zone H-2 the line downstream of MO-57 to be highlighted aqua/cyan for inclusion as residual heat removal safety related while the code boundary flag shows this section of line to be "NC". Is this section of pipe included in scope because it is safety related or non-safety related affecting safety related?

NPPD Response:

The nonsafety-related drain piping downstream of valve MO-57 up to the reactor building wall shown on drawing LRA-2040-SH02, is in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) and should be highlighted in yellow. The piping is evaluated as component type 'piping' in LRA Table 3.2.2-8-1, "Residual Heat Removal System [10 CFR 54.4(a)(2)]."

NRC Request: *RAI 2.3.2.7-1*

Primary Containment

Drawing LRA-2084 shows instrument lines to PT-2104A and PI-2104AG at zone A-3 branching off an instrument line from penetration X-40A with root valve NBI-49. Drawing LRA-2026-SH01 shows NBI-49 as being the root valve for a Jet Pump 6 flow instrument line. Should the valve identified as NBI-49 shown on LRA-2084 actually be shown as PC-49 as it is shown on drawing LRA-2026-SH01?

NPPD Response:

Valve NBI-49 shown on drawing LRA-2084 at coordinates (A,3) is the same valve as the valve identified as PC-49 on drawing LRA-2026-SH01 at coordinates (E,5). PC-49 is the correct component identification for this valve.

NRC Request: *RAI 2.3.2.7-2*

Primary Containment

Drawing LRA-2084 shows a spare instrument line connection with isolation valve PC-426 at zone B-7 branching off an instrument line from penetration X-40D with root valve NBI-63. Drawing LRA-2026-SH01 shows NBI-63 as being the root valve for a Jet Pump 11 flow instrument line. Should the valve identified as NBI-63 shown on LRA-2084 actually be shown as PC-63 as it is shown on drawing LRA-2026-SH01?

NPPD Response:

Valve NBI-63 shown on drawing LRA-2084 at coordinates (B,7) is the same valve as the valve identified as PC-63 on drawing LRA-2026-SH01 at coordinates (E,8). PC-63 is the correct component identification for this valve.

NRC Request: *RAI 2.3.2.7-3*

Primary Containment

Drawing LRA-2022-SH01 shows at zones E-3/4 an instrument line with isolation valve PC-370 to a PI-3063 on electrical penetration X-101E. This line is not highlighted as being in scope as safety related or non-safety related affecting safety related. The code boundary flag associated with PC-370 appears to show this line as class 2. The lines containing PC-542 and PC-541 from the drywell personnel airlock are color coded as being in scope with the primary containment.

Are the pressure gage and test connection instrument lines on this (and similarly for other) electrical penetrations in scope?

NPPD Response:

The instrument line with isolation valve PC-370 to PI-3063 on electrical penetration X-101E is not in scope. PC-370 and PI-3063 are nonsafety-related components used for leak monitoring of the penetration. The pressurized nitrogen gas inside the penetration acts only as a leak monitoring medium. It does not provide or contribute to the sealing capability of the penetration. X-101E is unique to the other electrical penetrations as it is the only unit including a pressurized nitrogen gas leak monitoring medium.

NRC Request: *RAI 2.3.3.8-1*

Heating, Ventilation and Air Conditioning

Drawing LRA-2024-SH02 shows the H&V Units 1-HV-DG-1A and 1-HV-DG-1B enclosures and associated inlet ducting and damper and exhaust ducting are not highlighted as being in scope. The USAR description indicates that these units normally operate continuously and does not indicate that they are shutdown when the larger H&V units (1-HV-DG-1C and 1-HV-DG-1D) start. The exhaust air flow shown on the drawing appears to be the sum of both the large and small H&V units supply flow. Are these smaller H&V units credited for maintaining acceptable diesel generator room temperatures when the diesels are operating? Could there be any failure of the housing/ducting/dampers associated with these smaller diesel generator room H&V units that could result in a diversion/disruption of adequate airflow/cooling of the diesel generator rooms when the diesels are operating?

NPPD Response:

The smaller heating and ventilating (H&V) units are not credited for maintaining acceptable diesel generator room temperatures when the diesels are operating. Safety-related cooling requirements are met by 1-HV-DG-1C and 1D.

The smaller H&V units and associated components are nonsafety-related, and their failure would not affect the capability of the larger units to perform their safety-related cooling function.

NRC Request: *RAI 2.3.3.8-2*

Heating, Ventilation and Air Conditioning

Drawing LRA-2024-SH02 in zones G/H-6/7 shows a cooling coil condensation/leakage drain line from the 1-HV-DG-1D H&V Unit as not being highlighted as being in scope while the sister *unit 1-HV-DG-1C has its cooling coil drain line highlighted as being in scope due to non-safety related affecting safety related. Please explain the difference in scoping of these drain lines.*

NPPD Response:

The cooling coil condensation/leakage drain line from the 1-HV-DG-1D H&V Unit, as shown on drawing LRA-2024-SH02, in zones G/H-6/7, is in scope and subject to aging management review for 10 CFR 54.4(a)(2) and should be highlighted. However, this drain line is included in the component type of 'piping' in Table 3.3.2-14-11, "Heating and Ventilation System [10 CFR 54.4(a)(2)]."

NRC Request: *RAI 2.3.3.8-3*

Heating, Ventilation and Air Conditioning

Drawing LRA-2018 in zones H/J-6/7 shows the battery rooms non-essential exhaust subsystem not highlighted as being in scope. Could there be any failure of the ducting/dampers in this nonessential subsystem that could result in a diversion/disruption of adequate airflow in the essential control building HVAC system?

NPPD Response:

The components in the battery rooms non-essential exhaust subsystem are nonsafety-related components. Their failure does not affect the capability of the essential control building HVAC system to perform its safety functions.

NRC Request: *RAI 2.3.3.14-1*

Auxiliary Systems in Scope for 10 CFR 54.4(a)(2)

Drawing LRA-2012-SH01 at grid location B-2 shows a valve ACD-23 and section of downstream line as not being highlighted as in scope while the line it connects to is highlighted as being in scope. The note in red next to the valve reads "AC UNIT ISOLATED". Is ACD-23 the boundary between the AC Unit and the drain line and if so, should it be highlighted as being in scope?

NPPD Response:

The nonsafety-related valve ACD-23 and associated piping shown on drawing LRA-2012-SH01, are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) and should be highlighted in yellow. The components are evaluated as component types 'piping' and 'valve body' in LRA Table 3.3.2-14-1, "Auxiliary Condensate Drains System [10 CFR 54.4(a)(2)]."

<u>NRC Request</u>: *RAI 2.3.3.14-2*

Auxiliary Systems in Scope for 10 CFR 54.4(a)(2)

Drawing LRA-2004-SH02 in zone B-8 shows a 2" flanged Tee and downstream flanged spool piece highlighted as being in scope that has a Note "TEE FOR PRE-OP CHEMICAL FLUSH, DURING NORMAL OPERATION REMOVE TEE & BLIND FLANGE ENDS." Is this TEE and this spool piece normally removed as the note suggests and are the blind flanges that would "normally" be installed included in scope?

<u>NPPD Response</u>:

The tee and spool pieces are normally removed. The nonsafety-related blind flanges are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2). The blind flange components are evaluated as component type 'piping' in LRA Table 3.3.2-14-1, Auxiliary Condensate Drains System [10 CFR 54.4(a)(2)].

<u>NRC Request</u>: *RAI 2.3.3.14-3*

Auxiliary Systems in Scope for 10 CFR 54.4(a)(2)

Drawing LRA-2042-SH01 in zone B-4 shows the 6" RWCU line from MO-18 out to flow element FE-170 and the ¾" instrument lines associated with FE-170 highlighted red as being in scope as part of the reactor coolant system boundary. The drawing shows the code boundary to be at MO-18. Please confirm that these components are in scope as being part of the reactor coolant system boundary rather than non-safety related affecting safety related.

<u>NPPD Response</u>:

Although the Class 1 pressure boundary terminates at valve MO-18, the tubing and instrument valves up to flow element FE-170 are conservatively classified as safety-related and were reviewed with the reactor coolant system. These components are considered in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(1). The flow element is evaluated in LRA Table 3.1.2-3, Reactor Coolant Pressure Boundary as component type 'flow element (non-Class 1).' The remaining associated components are evaluated in LRA Table 3.1.2-3 as component types 'tubing' and 'valve body.'

NRC Request: *RAI 2.3.3.14-4*

Auxiliary Systems in Scope for 10 CFR 54.4(a)(2)

Drawing LRA-2027-SH01 in zones A/B-3 shows the line between test connection valves RR-41 and RR-42 as well as RR-42 as not being highlighted as being in scope. This seems to be at variance with similar configurations where the scope boundary extends outboard of the first test, vent, drain line valve to a second valve, cap or flange. Please explain the scoping rationale for not including the test connection line past RR-42.

NPPD Response:

Nonsafety-related valve RR-42 and piping between RR-41 and RR-42 shown on drawing LRA-2027-SH01 are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) and should be highlighted in yellow. The valve and piping are evaluated as component types 'valve body' and 'piping' respectively in LRA Table 3.3.2-14-21, Reactor Recirculation System [10 CFR 54.4(a)(2)].

NRC Request: *RAI B.1.7-5*

Regarding the exception to the Boiling Water Reactor (BWR) Stress Corrosion Cracking (SCC) AMP

Background
In LRA Appendix B Section B.1.7, the applicant stated that the BWR Stress Corrosion Cracking Program has an exception to the GALL Report. The applicant stated that the exception is that the scope of welds selected for examination is based on risk-informed inservice inspection (RIISI) methodology approved by the NRC as well as NRC GL 88-01 and the RI-ISI methodology creates a different inspection schedule for GL 88-01 Category A welds than that delineated in GL 88-01.

In addition, the applicant stated that the applicant's RI-ISI methodology provides an acceptable level of quality and safety and in order to continue the alternative in subsequent intervals during the period of extended operation (beyond the fourth 10-yr interval) approval must be obtained in accordance with 10 CFR 50.55a.

Issue
With or without modifications allowed by BWRVIP-75-A, GL 88-01 requires a specific inspection extent and schedule for Category A welds depending on the water chemistry of reactor coolant. The staff requests the following information to evaluate whether the applicant's methodology is adequate in comparison with GL 88-01.

Request

1. *Confirm whether only Category A welds may have a different inspection extent and schedule in the applicant's program when the program is compared with GL 88-01. If the RI-ISI methodology affects any other GL 88-01 inspection category welds in terms of inspection extent and schedule, clarify what categories are affected by the RI-ISI methodology.*

2. *Provide what actions will be taken in the applicant's program if the extent and schedule of the affected categories, which were identified in the first request, do not meet the requirements of GL 88-01. Provide the justification why the applicant's actions are adequate for the aging management of stress corrosion cracking in the stainless steel and nickel alloy components.*

NPPD Response:

1. The extent and schedule for examination of Category A welds in the CNS RI-ISI program is consistent with the requirements of GL 88-01 and BWRVIP-75A. The extent and schedule for examination of the one Category D weld is consistent with BWRVIP-75A; once every six years.

2. No weld categories other than Category A are affected by the RI-ISI program.

NRC Request: *RAI B.1.7-6*

BWR SCC AMP Scope over Class 1 versus Non-Class 1

Background
In LRA Table 3.1.2-3 for the components in the reactor coolant pressure boundary, the applicant addressed AMR items of non-Class 1 flow element, instrument line snubber, piping and fittings, tubing and valve body made of stainless steel that are subject to stress corrosion cracking (SCC) in a treated water (> 140 °F) environment in relation to Table 1 item 3.2.1-8. The LRA Table also indicated that the non-Class 1 components are less than 4 inches NPS and are not the part of the pressure boundary as described by Plant-Specific Note 105.

Although the applicant stated that the components are less than 4 inches NPS, the staff was concerned that if the BWR Stress Corrosion Cracking Program is not credited for non-Class 1 components with a nominal diameter of 4 inches or larger, the aging management approach might be in potential conflict with the requirements of GL 88-01 and BWRVIP-75-A as cited in the GALL Report BWR Stress Corrosion Cracking Program that applies to relevant BWR components regardless of ASME Code classification including non-Class 1 components.

Issue

In addition, in LRA Appendix B Section B.1.7, the applicant stated that the BWR Stress Corrosion Cracking Program of the applicant manages SCC and its effect on the reactor coolant pressure boundary components and in LRA Section 2.3.1.3, the applicant stated that the major components of the reactor coolant pressure boundary include the reactor vessel, recirculation loops and the Class 1 portions of various systems connected to the reactor vessel. The statements of the applicant suggest that the applicant's BWR SCC program mainly manages SCC and its effect for Class 1 components only.

Request

1. *Clarify whether the applicant's program manages SCC and its effect on non-Class 1 components as well as Class 1 components.*

2. *Clarify whether the CNS has non-Class 1 components that are subject to the scope of the GALL Report BWR SCC Program in conjunction with GL 88-01.*

3. *If the CNS has non-Class 1 components under the scope of the GALL Report BWR SCC Program in conjunction with GL 88-01 and the applicant's BWR SCC Program does not manage the aging effect of the non-Class 1 components, clarify what aging management program is used to manage SCC and its effect on non-Class 1 components and provide the justification why a different program is used for the aging management.*

NPPD Response:

1. Stress corrosion cracking in non-Class 1 components is not managed by the BWR Stress Corrosion Cracking program. Other programs, such as the Water Chemistry Control – BWR Program, along with the One-Time Inspection program to verify the chemistry program effectiveness, manage stress corrosion cracking for non-Class 1 components (see the response to RAI B.1.7-3[2]).

2. As described in NUREG-1801 XI.M7 "BWR Stress Corrosion Cracking (SCC)," the program is delineated in Generic Letter (GL) 88-01 and it's Supplement 1. Non-Class 1 piping and welds were originally included in the scope of the GL 88-01 program requirements. However, the non-Class 1 piping and welds were subsequently removed from the scope of the program in accordance with the provisions of GL 88-01, Supplement 1. Therefore, there are no non-Class 1 components subject to the scope of the BWR SCC Program and GL 88-01.

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[2] NLS2009040, Stewart B. Minahan to USNRC, "Response to Request for Additional Information for License Renewal Application – Aging Management Programs," June 15, 2009 (ADAMS Accession Number ML091690050).

3. CNS has no non-Class 1 components subject to the scope of the BWR SCC Program and GL 88-01.

NRC Request: *RAI 3.1.2.1-1*

ESF and Aux. systems

Background
In LRA Table 3.1.2-3, the applicant addressed the AMR items of stainless steel piping, piping components and piping elements that are part of the reactor coolant boundary and are subject to SCC in a treated water (> 140 °F) environment.

In LRA Table 3.2.2-1, 3.2.2-8-1, 3.2.2-8-3 and 3.2.2-8-4, the applicant also addressed the AMR items of stainless steel piping, piping components and piping elements in the engineered safety features system that are subject to SCC in a treated water (> 140 °F) environment.

Similarly, in LRA Tables 3.3.2-2, 3.3.2-14-3, 3.3.2-14-13, 3.3.2-14-16 and 3.3.2-14-21, the applicant addressed the AMR items of stainless steel piping, piping components and piping elements in the auxiliary systems that are subject to SCC in a treated water (> 140 °F) environment.

In LRA Table 3.2.1, item 3.2.1-18 related to the AMR items of the reactor coolant pressure boundary and engineered safety features system and LRA Table 3.3.1, item 3.3.1-38 related to the AMR items of the auxiliary systems, the applicant stated that the BWR Water Chemistry Control – BWR Program is used to manage the aging effect and the effectiveness of the programs will be confirmed by the One-Time Inspection Program.

However, in LRA Table 3.1.2-3, 3.2.2-1, 3.2.2-8-1, 3.2.2-8-3, 3.2.2-8-4, 3.3.2-2, 3.3.2-14-3, 3.3.2-14-13, 3.3.2-14-16 and 3.3.2-14-21, the detailed AMR items credited only the Water Chemistry Control – BWR Program with no additional note for the One-Time Inspection Program in contrast to the statements in LRA Table 3.2.1, item 3.2.1-18 and in LRA Table 3.3.1, item 3.3.1-38.

Issue
It is not clear whether the One-Time Inspection will be used in conjunction with the Water Chemistry Control – BWR Program to manage the aging effect of the AMR items for the reactor coolant pressure boundary, engineered safety features system and auxiliary systems, respectively.

<u>Request</u>
Clarify whether the One-Time Inspection will be used in conjunction with the Water Chemistry Control – BWR Program to manage the aging effect of the AMR items for the reactor coolant pressure boundary, engineered safety features system and auxiliary systems, respectively.

<u>NPPD Response</u>:

As stated in LRA Sections B.1.29 and B.1.39, the One-Time Inspection Program provides verification of the effectiveness of the Water Chemistry Control – BWR Program for all component, material and environment combinations that credit the water chemistry control program. This includes the management of cracking as listed in LRA Tables 3.1.2-3, 3.2.2-1, 3.2.2-8-1, 3.2.2-8-3, 3.2.2-8-4, 3.3.2-2, 3.3.2-14-3, 3.3.2-14-13, 3.3.2-14-16 and 3.3.2-14-21.

A plant specific note referring to the One-Time Inspection Program is included in the LRA tables wherever the comparable NUREG-1801 line item recommends both the water chemistry and one-time inspection programs. This note is added to demonstrate how the plant aging management result aligns with the NUREG-1801 recommendations. For those line items compared to NUREG-1801 line items that do not specify one-time inspections, the note is not used, even though the One-Time Inspection Program applies wherever the water chemistry program is credited.

<u>NRC Request</u>: *RAI 3.1.2.1-2*

<u>Background</u>
In LRA Table 3.1.2-3 (page 3.1-54), the applicant addressed the stainless steel piping, piping elements and piping components in the control rod drive system that are the part of the reactor pressure boundary and are subject to stress corrosion cracking in a treated water environment (> 140 °F). The applicant credited the Inservice Inspection – ISI Program and Water Chemistry Control – BWR Program for the aging management. The applicant also indicated that the consistency note for the AMR item is Note E, which means that the AMR item is consistent with the GALL Report in terms of component, material, environment and aging effect, but a different aging management program is credited for the aging management.

<u>Issue</u>
It is not clear why the applicant did not credit the BWR Stress Corrosion Cracking Program even though the AMR item is regarded to be included in the program scope.

<u>Request</u>
Clarify why this AMR item of the CRD system did not credit the BWR Stress Corrosion Cracking although this item is regarded to be included in the scope of the BWR SCC program. Provide the justification why the Inservice Inspection Program in conjunction with the water chemistry control program can provide adequate aging management for the AMR item.

NPPD Response:

The component type "control rod drive" in LRA Table 3.1.2-3, on page 3.1-54, refers to the control rod hydraulic drive unit, mounted on the control rod housings below the reactor vessel. The drive unit is stainless steel and is part of the reactor coolant pressure boundary, but it is not a component type subject to intergranular stress corrosion cracking (IGSCC) within the scope of the BWR SCC Program and GL 88-01.

NUREG-1801 does not recognize the control rod hydraulic drive unit as a component. NUREG-1801 line item IV.C1-9 provided the closest comparable aging management results for this material, environment, aging effect combination. Note E was used to denote that an aging management program different from that recommended in IV.C1-9 was credited. Note E does not imply that the component is consistent with those listed in NUREG-1801.

Although the BWR SCC Program does not apply to the CRD hydraulic drive units, the Inservice Inspection Program requirements for this Class 1 component, in conjunction with water chemistry, appropriately manage cracking through the use of periodic inspections and control of water chemistry that reduces the potential for these aging effects. NUREG-1801 line item IV.B1-8 credits water chemistry alone for managing stress corrosion cracking in a BWR reactor coolant environment. Therefore, the proposed combination, including the Inservice Inspection Program, should be adequate to manage cracking due to stress corrosion for the control rod hydraulic drive unit.

NRC Request: *RAI 3.2.2.3-1*

Background
In LRA Tables 3.2.2-4 and 3.2.2-5, the applicant addressed the AMR items of stainless steel flex hose, tubing, valve body, piping and restriction orifice in the engineered safety features (ESF) system that are subject to cracking in a lubricating oil environment.

In LRA Table 3.3.2-4, the applicant also addressed the AMR items of stainless steel restriction orifice, thermowell, tubing and valve body in the auxiliary systems that are subject to cracking in a lubricating oil environment.

The applicant credited the Oil Analysis Program to manage the cracking. However, the applicant did not provide the aging mechanisms associated with the aging effect.

Issue
The applicant did not provide the aging mechanism of cracking that the staff needs to know in order to evaluate the adequacy of the applicant's aging management program.

Request
As for each of the systems (ESF and auxiliary systems): Clarify what aging mechanism causes the stainless steel cracking in the lubricating oil environment. Provide the justification why the Oil Analysis Program can adequately manage the aging effect.

NPPD Response:

The aging mechanisms that cause cracking in the lubricating oil environment are stress corrosion cracking and intergranular attack. For these aging mechanisms to occur in an oil environment a corrosive environment (water) and a susceptible material must be present. The components above are made of a susceptible material (stainless steel). The lubricating oil environment is normally not corrosive unless there is water in the oil in sufficient quantities. Without an effective program to control the quality of the oil, there is a potential for lubricating oils to contain sufficient quantities of water to cause the aging effect of cracking. The Oil Analysis Program described in LRA Section B.1.28 manages the oil environments through periodic sampling and analysis such that water content is maintained at a level that precludes a corrosive environment and thereby manages cracking of stainless steel. The One-Time Inspection Program utilizes inspections or non-destructive evaluations of representative samples to verify that the Oil Analysis Program is effective at managing aging effects.

NRC Request: *RAI 3.2.2.1-2*

Carbon Steel

Background
SRP-LR and LRA Table 3.2.1-32 address the loss of material due to general corrosion from the internal surfaces of steel piping, piping components, and piping elements exposed to uncontrolled indoor air. The applicant proposes to manage this aging process through the use of its aging management program "External Surfaces Monitoring" (LRA B.1.14). The GALL Report recommends that this aging process be managed through the use of the aging management program "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" (GALL Report Volume 2 Chapter XI.M38). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.2.1-32 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

Issue
In its review of LRA Table 3.2.1-32 the staff noted that the component being considered is the internal surface of piping and ducting. The staff also noted that the aging management program proposed by the applicant is primarily designed to monitor the condition of external surfaces. The staff further noted that the prediction of internal corrosion based on monitoring external

surfaces of the same component is possible only when the interior and exterior environments are identical. Lastly the staff noted that sufficient information was not provided in the application to permit a determination that the interior and exterior environments of the components under consideration were identical.

Request

Please select an aging management program designed to monitor the internal surfaces of piping and ducting exposed to uncontrolled indoor air or justify why an external inspection is appropriate to manage the aging of internal corrosion. Justification should be sufficient to demonstrate that the environments are identical in terms of items such as coatings, temperature, velocity, humidity, and contaminants.

NPPD Response:

As stated in CNS LRA Table 3.2.1, item 32, loss of material from the internal surfaces of steel components exposed to air – indoor is managed by the External Surfaces Monitoring, Fire Protection, and Periodic Surveillance and Preventive Maintenance Programs. This RAI response focuses only on those line items where the External Surfaces Monitoring Program was cited. A discussion of these line items is provided below. Conforming changes to the LRA are provided, as needed, in Attachment 2 (Changes 14, 34, and 35).

LRA Table 3.2.2-1, Residual Heat Removal System

Component types piping, trap, and valve body are shown on drawing LRA-2041 and consist primarily of steam supply components. The environment of air-indoor (int) was initially assigned to selected components based on Note 21 (coordinates E-1 and E-4) which describes isolation of steam condensing mode piping. Since the piping is normally filled with treated water, the internal environment for these components is revised (see Attachment 2, Change 6).

LRA Table 3.2.2-3, Automatic Depressurization System

Component types piping and valve body provide a discharge path from the main steam relief valves to the suppression chamber as shown on drawing LRA-2028. These components are normally exposed to nitrogen gas inside the drywell. NPPD conservatively evaluated the components using the internal environment of indoor air, which remains in the piping after assembly following an outage with no exposure to treated water or steam during normal operation. However, the internal environment may be exposed to humidity levels not normally present in the drywell. Because the internal and external environments are not identical, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 7).

LRA Table 3.2.2-4, High Pressure Coolant Injection

Component types piping and valve body provide level instrumentation for the suppression chamber as shown on drawing LRA-2044 (coordinates A/B-1/2). These components are normally exposed to nitrogen gas from the suppression chamber and aging effects are not expected. NPPD conservatively evaluated the components using the internal environment of indoor air. Since the internal and external environments are not identical, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor will be changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 8).

LRA Table 3.2.2-6, Standby Gas Treatment

Component types damper housing, fan housing, piping, and valve body are shown on drawing LRA-2037. The system is normally in standby and the components are exposed to indoor air. The internal and external surfaces of the components are not coated. Since system component internal and external surfaces are exposed to building air with identical humidity, temperature, and contaminant properties, the internal and external material-environment combinations are equivalent. Therefore, the inspection of component external surfaces will be indicative of the internal material condition.

LRA Table 3.2.2-7, Primary Containment System

Component types piping and valve body as shown on drawing LRA-2022-SH01 (coordinates G-3 and G-7) provide penetrations into the drywell for instrumentation and a pathway for nitrogen supply. Component types piping and valve body as shown on drawings LRA-2027-SH01 (coordinates H-6/7/8) and LRA-2027-SH02 (coordinates H-3/4/5) support vacuum breaker operation between the torus, drywell, and reactor building. These components are normally exposed to nitrogen gas and aging effects are not expected. NPPD conservatively evaluated the components using the internal environment of indoor air. Since the internal and external environments are not identical, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 10).

LRA Table 3.2.2-8-6, Primary Containment System [10 CFR 54.4(a)(2)]

Component type damper housing as shown on drawing LRA-2020 (coordinates A-8 and C-8) is part of the drywell ventilation system. These components are normally exposed to nitrogen gas and aging effects are not expected. NPPD conservatively evaluated the components using the internal environment of indoor air. Since the internal and external environments are not identical, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 11).

LRA Table 3.3.2-4, Diesel Generator System

Component types filter housing, heat exchanger (housing), piping, and turbocharger as shown on drawing LRA-KSV-96-3 are part of the diesel generator air intake sub-system. Though the internal and external surfaces of the diesel generator intake filter housing and piping component types are exposed to the identical environment of indoor air, the external surfaces are coated. Therefore, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program. The heat exchanger housing (intercooler housing) and turbocharger internal environments may be inconsistent with the properties of the external indoor air environment. Therefore, the aging effects associated with the internal environment of indoor air for these components will be managed by the Periodic Surveillance and Preventive Maintenance Program. Component types accumulator, filter housing, strainer, strainer housing, piping, and valve body as shown on drawing LRA-2077 are part of the diesel generator starting air sub-system. The internal environment of these components is more appropriately identified as condensation with the associated aging effects managed by the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 16).

LRA Table 3.3.2-5, Fuel Oil Systems

Component type piping as shown on drawing LRA-2011-SH01 (coordinates A-6 and A-10) is part of the vent path to diesel fuel storage tanks. Though the internal and external surfaces of the vent path are exposed to the identical environment of indoor air, only the piping external surface is coated. Therefore the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 17).

LRA Table 3.3.2-6, Fire Protection – Water System

Component type duct is the intake duct on the diesel engine-driven fire pump. Though the internal and external surfaces of the duct component type are exposed to the identical environment of indoor air, the external surface is coated. Therefore, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program. The component types nozzle and piping represent the spray nozzles and piping for the dry pipe water suppression sub-system. Since the carbon steel external material is coated, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 18).

LRA Table 3.3.2-8, Heating, Ventilation, and Air Conditioning System

Component types damper housing, duct, fan housing, filter housing, heat exchanger, louver housing, restriction orifice, and valve body move indoor air throughout the station. The internal and external surfaces for these component types are not coated. Since system components internal and external surfaces are exposed to building air with identical humidity, temperature, and contaminant properties, the internal and external material-environment combinations are equivalent. Therefore, inspection results from component external surfaces will be indicative of the internal material condition.

LRA Table 3.3.2-12, Plant Drains System

Component types piping and valve body are part of Z-sump instrumentation as shown on drawing LRA-2037 (coordinates C-10/11). The internal environment of these components is more appropriately identified as condensation with the associated aging effects managed by the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 20).

LRA Table 3.3.2-13, Nitrogen System

Component types piping and valve body assigned to the nitrogen system as shown on drawing LRA-2022-SH01 (coordinate A-10) supply nitrogen gas to the drywell. These components are exposed to gas and not air-indoor internal. LRA Table 3.3.2-13 is revised to delete these line items (see Attachment 2, Change 21).

LRA Table 3.3.2-14-11, Heating, Ventilation, and Air Conditioning System [10 CFR 54.4(a)(2)]

Component types damper housing, duct, fan housing, and flow element, as shown primarily on drawing LRA-2020, provide ventilation to the station. The internal and external surfaces for these component types are not coated. Since system components external and internal surfaces are exposed to building air with identical humidity, temperature, and contaminant properties, the internal and external material-environment combinations are equivalent. Therefore, inspection results from component external surfaces will be indicative of the internal material condition.

LRA Table 3.3.2-14-20, Radiation Monitoring – Ventilation System [10 CFR 54.4(a)(2)]

Component types piping and valve body assigned to the radiation monitoring – ventilation system as shown on drawing LRA-2022-SH01 (coordinate D-2) are normally exposed to nitrogen gas from the drywell. NPPD conservatively evaluated the components using the internal environment of indoor air. Since the internal and external environments are not identical, the aging management program to manage the internal surfaces of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 25).

NRC Request: *RAI 3.2.2.1-3*

Background
LRA and SRP Tables 3.2.1-32 address the loss of material due to general corrosion from the internal surfaces of steel piping, piping components, and piping elements exposed to uncontrolled indoor air. The applicant proposes to manage this aging process through the use of its aging management program "Fire Protection" (LRA B.1.16). The GALL Report recommends that this aging process be managed through the use of the aging management program "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" (GALL Report Vol. 2 XI.M38). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.2.1-32 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

Issue
In its review of LRA Table 3.2.1-32 the staff noted that the aging effect being considered is the loss of material due to general corrosion on the internal surface of piping and ducting. The staff also noted that the scope of the proposed aging management program does not include either the internal surfaces of piping in ducting or detection of loss of material due to general corrosion.

Request
Please select an aging management program with a scope which includes detecting loss of material due to general corrosion on the internal surfaces of piping and ducting exposed to uncontrolled indoor air or justify how the currently proposed aging management program will adequately address the corrosion of the components under consideration.

NPPD Response:

LRA Table 3.3.2-7, Halon and CO_2 Systems, provides aging management review results for carbon steel nozzle, piping, and valve body components exposed to air – indoor (int). These components are downstream of system isolation valves on the distribution header. The aging management program to manage the internal portions of carbon steel components exposed to air-indoor is changed to the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Changes 4, 13, 19, 34, and 35).

NRC Request: *RAI 3.2.2.1-6*

Background
LRA and SRP Tables 3.3.1-58 address the loss of material due to general corrosion from the external surfaces of steel components exposed to uncontrolled indoor air, outdoor air, and condensation. The applicant proposes to manage this aging process through the use of its aging

management program "Fire Protection" (LRA B.1.16). The GALL Report recommends that this aging process be managed through the use of the aging management program "External Surfaces Monitoring" (GALL Report Volume 2 Chapter XI.M36). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.3.1-58 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

Issue
In its review of LRA Table 3.3.1-58 the staff noted that the aging effect being considered is the loss of material due to general corrosion on the external surface of steel components. The staff also noted that the scope of the proposed aging management program does not include the detection of loss of material due to general corrosion.

Request
Please select an aging management program with a scope which includes detecting loss of material due to general corrosion on external steel surfaces exposed to uncontrolled indoor air, outdoor air, or condensation or justify how the currently proposed aging management program will adequately address the corrosion associated with these components.

NPPD Response:

LRA Table 3.3.1, Item 58, states "For some steel components of the halon and CO_2 systems, the Fire Protection Program manages loss of material using periodic visual inspections." The Fire Protection Program manages loss of material due to general corrosion from the external surfaces of steel components exposed to uncontrolled indoor air, only for the components of the halon and CO_2 systems.

The scope of the Fire Protection Program, as described in NUREG-1801, XI.M26 explicitly states that the program "includes management of the aging effects on the intended function of the halon/CO_2 fire suppression system." Furthermore, the NUREG-1801, XI.M26 program description states the following in the Detection of Aging Effects program element:

"Visual inspections of the halon/CO_2 fire suppression system detect any sign of added degradation, such as corrosion, mechanical damage, or damage to dampers."

Therefore, the NUREG-1801, XI.M26, Fire Protection Program manages degradation of the halon/CO_2 fire suppression systems, including loss of material due to corrosion. As indicated in LRA Section B.1.16, Fire Protection, the CNS Fire Protection Program is consistent with the NUREG-1801 program description with respect to visual inspections of the halon and CO_2 fire suppression systems to manage loss of material due to corrosion.

Additionally, use of the Fire Protection Program has been accepted by the staff as an appropriate aging management program for external surfaces of the James A. FitzPatrick CO_2 fire suppression system. Refer to NUREG-1905, Safety Evaluation Report Related to the License Renewal of James A. FitzPatrick Nuclear Power Plant, Section 3.0.3.2.11, Fire Protection Program (ADAMS Accession Number ML080250372).

Since there are provisions in the elements of the Fire Protection Program to perform visual inspections of external surfaces of halon and CO_2 systems and this position has previously been accepted by the staff, the cited program is a reasonable alternative to the External Surfaces Monitoring Program.

NRC Request: *RAI 3.2.2.1-7*

Background
LRA and SRP Tables 3.3.1-71 address the loss of material due to general, pitting, and crevice corrosion from the internal surfaces of steel piping, piping components, and piping elements exposed to moist air or condensation. The applicant proposes to manage this aging process through the use of its aging management program "Periodic Surveillance and Preventive Maintenance" (LRA B.1.31). The GALL Report recommends that this aging process be managed through the use of the aging management program "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" (GALL Report Volume 2 Chapter XI.M38). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.3.1-71 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

Issue
In its review of LRA Table 3.3.1-71 the staff noted that the proposed and recommended aging management programs appear to differ in how many components are inspected and the frequency of that inspection. The proposed program appears to indicate that a sample of sufficient size to provide 90% confidence that 90% of the components will not degrade will be inspected every 5 years. The recommended program indicates that all components will be inspected whenever the component is accessible. Based on the difference in the sample size outlined above it is not clear to the staff that the same level of inspection is provided by the proposed AMP when compared with the AMP recommended by the GALL Report.

Request
Please demonstrate that the level of inspection provided by the proposed aging management program is equivalent to that provided by the recommended aging management program.

NPPD Response:

As indicated for items that refer to CNS LRA Table 3.3.1, item 71, loss of material for steel components exposed to condensation is managed by the Periodic Surveillance and Preventive Maintenance Program. This line item is reflected in LRA Table 3.3.2-4, Diesel Generator, for the internal surfaces of moisture separator housing, piping, receiver, and valve body components and LRA Table 3.3.2-14-7, Diesel Generator Starting Air [10 CFR 54.4(a)(2)], for the internal surfaces of piping and valve body components.

Use of the 90/90 criteria described in EPRI Report 107514 as proposed for the Periodic Surveillance and Preventive Maintenance Program may, in fact, exceed the level of inspection provided by the recommended aging management program in NUREG-1801 (Generic Aging Lessons Learned (GALL) Report) Volume 2 Chapter XI.M38. The XI.M38 program stipulates inspections only during the performance of other activities when surfaces are made accessible for visual inspection which may rarely occur. In contrast, a sample size based on the 90/90 criteria requires the scheduling of a specific number of inspections on a specific frequency solely for the implementation of this program.

The NRC staff, as documented in the license renewal SER for FitzPatrick (ADAMS Accession Number ML080250372), Section 3.3.2.1.14 "Loss of Material due to General, Pitting, and Crevice Corrosion," has determined that Aging Management Review (AMR) results addressed by this line item which credit a plant-specific Periodic Surveillance and Preventive Maintenance Program are acceptable for managing loss of material for steel components exposed to condensation.

In summary, the Periodic Surveillance and Preventive Maintenance Program will provide reasonable assurance that the effects of aging are managed such that these components will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation.

NRC Request: *RAI 3.4.2.1-2*

Background
LRA and SRP Tables 3.4.1-30 address the loss of material due to general, crevice and pitting corrosion from the internal surfaces of steel piping, piping components, and piping elements exposed to outdoor air or condensation. The applicant proposes to manage this aging process through the use of its aging management program "External Surfaces Monitoring" (LRA B.1.14). The GALL Report recommends that this aging process be managed through the use of the aging management program "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" (GALL Report Volume 2 Chapter XI.M38). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items

associated with Table 3.4.1-30 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

Issue
In its review of LRA Table 3.4.1-30 the staff noted that the component being considered is the internal surface of steel piping. The staff also noted that the aging management program proposed by the applicant is primarily designed to monitor the condition of external surfaces. The staff further noted that the prediction of internal corrosion based on monitoring external surfaces of the same component is possible only when the interior and exterior environments of that component are identical. Lastly the staff noted that sufficient information was not provided in the application to permit a determination that the interior and exterior environments of the components under consideration are identical.

Request
Please select an aging management program designed to monitor the internal surfaces of steel piping exposed to outdoor air or condensation or justify why an external inspection is appropriate to manage internal corrosion. Justification should be sufficient to demonstrate that the environments are identical in terms of items such as coatings, temperature, velocity, humidity, and contaminants.

NPPD Response:

CNS LRA Table 3.4.1, Item 3.4.1-30, addresses loss of material from the internal surfaces of steel components exposed to air – outdoor or condensation. Aging management review results for two component types refer to Item 3.4.1-30. These components are listed in LRA Tables 3.2.2-6 and 3.3.2-5 and discussed below.

LRA Table 3.2.2-6, for the standby gas treatment system, includes a line item for carbon steel piping exposed internally to outdoor air. This line item is for the plant stack (elevated release point) shown on drawing LRA-2037 (B-9). It has been determined that the humidity inside this pipe is normally higher than outside the pipe due to plant discharges during operation such that outdoor air may not be the appropriate environment for the inside of the pipe. Therefore, the internal environment of the plant stack is revised to identify condensation with loss of material for the internal surface managed by the Periodic Surveillance and Preventive Maintenance Program (see Attachment 2, Change 9).

LRA Table 3.3.2-5 for the fuel oil systems includes a line for gray cast iron (steel) flame arrestors exposed internally to outdoor air. This line was for the flame arrestor on the fire pump diesel tank, shown on drawing LRA-2016, sheet 2 (H-1). Further review has determined that the flame arrestor is aluminum rather than cast iron. Therefore, the aging management review results for the flame arrestor are addressed by the lines of LRA Table 3.3.2-5, for aluminum flame arrestors. The review also determined that the flame arrestors on the diesel oil storage tanks shown on drawing LRA-2011 (A-7, A-10) have an internal flow restrictor subcomponent composed of copper alloy. As a result, LRA Table 3.3.2-5 is being revised (see Attachment 2, Change 17).

The above changes also result in conforming changes to LRA Table 3.2.1, 3.4.1, A.1.1.31, and B.1.31 (see Attachment 2, Changes 5, 27, 34, and 35).

<u>NRC Request</u>: *RAI 3.4.2.1-3*

<u>Background</u>
LRA and SRP Tables 3.4.1-32 address the loss of material due to pitting, crevice, and microbiologically influenced corrosion of stainless steel piping, piping components, and piping elements exposed to raw water. The applicant proposes to manage this aging process through the use of its aging management program "One Time Inspection" (LRA B.1.29). The GALL Report recommends that this aging process be managed through the use of the aging management program "Open Cycle Cooling Water System" (GALL Report Vol. 2 XI.M20). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.4.1-32 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

<u>Issue</u>
In its consideration of these aging management review items the staff notes that the One Time Inspection AMP is designed to be used when the environment to which a system, structure or component is exposed is invariant with time, for example treated water systems where the water chemistry is frequently monitored and carefully controlled. In such systems, the lack of prior corrosion may be an indicator that future corrosion will not occur. Raw water systems cannot be considered to be invariant with time in terms of chemistry or microbiology. Since stainless steel is highly susceptible to microbiological corrosion and since microbiological corrosion can occur rapidly, the absence of past corrosion cannot be considered a reliable predictor of future corrosion. The staff also notes that the structures, systems, and components under consideration appear to be subject to Generic Letter 89-13 and that a one time inspection of these components appears to be inconsistent with the requirements of the Generic Letter.

<u>Request</u>
Please propose a program to manage the aging of the components under consideration which is consistent with Generic Letter 89-13, which recognizes the variability of the chemistry and microbiology of raw water, and which acknowledges the inability to use past corrosion performance as an indicator of future corrosion under such circumstances.

NPPD Response:

The only stainless steel component type in a raw water environment that credits the One-Time Inspection Program and aligns with LRA Table 3.4.1, item 32 is tubing in the circulating water system as shown in LRA Table 3.4.2-2-1. The actions in GL 89-13 apply to service water systems, defined in the generic letter as systems that transfer heat from safety-related structures, systems, or components to the ultimate heat sink. Since the circulating water system does not serve safety-related structures systems, or components, it is clearly not subject to GL 89-13. Therefore, it would be inappropriate to credit the Service Water Integrity Program (which includes all components subject to GL 89-13) for aging management.

The tubing in question is nonsafety-related small diameter (< ½ inch) which serves low pressure instrumentation in the circulating water system. The source of water in the circulating water system is the Missouri River. Stainless steel tubing has historically proven acceptable for long-term service in the river water (raw water) environment due to its inherent corrosion resistance in that environment. There has been no operating experience at CNS indicating aging effects for stainless steel tubing in a river water environment. The small diameter instrument tubing provides a stable environment that would experience little change over time such that inspections after thirty years of operation would be indicative of future performance.

In addition, Appendix A of NUREG-1800 states:

"The license renewal process is not intended to demonstrate absolute assurance that structures and components will not fail, but rather that there is reasonable assurance that they will perform such that the intended functions are maintained consistent with the CLB during the period of extended operation."

The appendix further states:

"The risk significance of a structure or component could be considered in evaluating the robustness of an aging management program. Probabilistic arguments may be used to assist in developing an approach for aging management adequacy. However, use of probabilistic arguments alone is not an acceptable basis for concluding that, for those structures and components subject to an AMR, the effects of aging will be adequately managed in the period of extended operation. Thus, risk significance may be considered in developing the details of an aging management program for the structure or component for license renewal, but may not be used to conclude that no aging management program is necessary for license renewal."

The small diameter nonsafety-related stainless steel tubing in question is included in scope only for its potential to impact safety-related equipment through spray or leakage. The risk significance is low since the potential for this interaction is low due to low system pressures in the circulating water system and the inherent durability of stainless steel tubing.

Considering the above discussion, and as stated in LRA B.1.29, the One–Time Inspection Program is appropriate for managing the effects of aging on the stainless steel tubing in the circulating water system.

NRC Request: *RAI 3.3.2.3-1*

Background
LRA Table 3.3.2-1 addresses the loss of material from the internal surfaces of the phenolic coated carbon steel accumulator in the standby liquid control system which is exposed to sodium pentaborate solution. The applicant proposes that this combination of material, environment and component is not contained in the GALL Report. The applicant acknowledges that corrosion for this material and environment combination is possible and proposes to manage that corrosion through the use of their plant-specific Aging Management Program "Periodic Surveillance and Preventive Maintenance". The applicant further states that the phenolic coating is not credited as part of the management of aging. Based on this statement, the staff considered the efficacy of the proposed aging management program relative to bare carbon steel material exposed to sodium pentaborate solution.

Issue
In its review of LRA Table 3.3.2-1 the staff noted that, for sodium pentaborate solutions exposed to stainless steel components, the GALL Report states that aging in the form of loss of material may occur and that this aging may be managed through a combination of the aging management programs "Water Chemistry – BWR" (GALL Volume 2, Chapter XI.M2) and "One Time Inspection" (GALL Volume 2, Chapter XI.M2). Given that the probability of corrosion for bare carbon steel in sodium pentaborate solutions is greater than for stainless steel, the staff believes that the aging management program used should be more comprehensive than that proposed for stainless steel. The staff also noted that the water chemistry program recommended by the GALL Report will be able to detect changes in the sodium pentaborate solution which may affect its corrosivity and will be able to detect soluble corrosion products in the solution.

Request
Propose an aging management program containing periodic inspections and water chemistry analyses or to justify how the existing program, which does not appear to include water chemistry measurements, will adequately manage corrosion of the carbon steel accumulator.

NPPD Response:

As shown in LRA Table 3.3.2-1, the Water Chemistry Control - BWR Program is credited for managing aging effects for the stainless steel components in the standby liquid control system exposed to the sodium pentaborate solution. This same water chemistry control program also maintains the quality of the sodium pentaborate solution within the carbon steel accumulators even though not specifically credited as an aging management program for the accumulators. It is not credited as an aging management program for the internal surfaces of the carbon steel accumulators because a sodium pentaborate solution is more corrosive than treated water and will result in loss of material for any carbon steel surface that is not coated even with water chemistry controls. Instead of the Water Chemistry Control – BWR program, periodic inspections of the internal surfaces of these coated carbon steel accumulators will be completed under the Periodic Surveillance and Preventive Maintenance Program. This internal inspection of the accumulator is a more direct verification of the material condition than monitoring of the system water chemistry for corrosion products. As indicated in LRA Section B.1.31, Periodic Surveillance and Preventative Maintenance, the Periodic Surveillance and Preventive Maintenance Program will inspect the internal surface and coating of the accumulators to verify the carbon steel is not experiencing a loss of material from exposure to sodium pentaborate solution.

<u>NRC Request</u>: *RAI 3.3.2.1-1*

<u>Background</u>
LRA and SRP Tables 3.3.1-53 address the loss of material due to general and pitting corrosion from the internal surfaces of steel piping, piping components, and piping elements exposed to condensation in the compressed air system. The applicant proposes to manage this aging process through the use of its aging management program "Periodic Surveillance and Preventive Maintenance" (LRA B.1.31). The GALL Report recommends that this aging process be managed through the use of the aging management program "Compressed Air Monitoring" (GALL Report Volume 2 Chapter XI.M24). The proposed aging management program is not consistent with the aging management program proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.3.1-53 are consistent with the GALL Report in terms of material, environment, and aging effect but a different aging management program is credited (generic note E).

<u>Issue</u>
In its review of LRA Table 3.3.1-53 the staff noted that the proposed aging management program includes the internal inspection of a single containment penetration associated with the compressed air system. The staff also noted that the aging management program recommended by the GALL Report is much more comprehensive including inspection, testing, and preventive maintenance. Given the difference in the programs, the staff questions the effectiveness of the proposed program.

<u>Request</u>
Please select an aging management program designed to detect general and pitting corrosion on the internal surfaces of piping, piping components and piping elements exposed to condensation in the compressed air system as well as a program which includes the testing and preventive maintenance components included in the AMP recommended by the GALL Report or justify how the proposed program will accomplish those functions.

NPPD Response:

As stated in CNS LRA Table 3.3.1, item 53, loss of material in steel components exposed to internal condensation is managed by the Periodic Surveillance and Preventive Maintenance Program. This is reflected in LRA Table 3.3.2-10 for the internal surfaces of carbon steel components piping and valve body in the instrument air system, and in LRA Table 3.3.2-14-25 for the internal surfaces of carbon steel piping and valve bodies in the service air system. This RAI highlights the aging management activity described as part of the Periodic Surveillance and Preventive Maintenance Program in LRA Section B.1.31: "Visually inspect the service air primary containment penetration X-21 carbon steel component internal surfaces to manage loss of material." The carbon steel components constituting primary containment penetration X-21, which is normally isolated from the service air system, include components piping and valve body as listed in LRA Table 3.3.2-10. LRA Section B.1.31 also includes an activity to visually inspect the internal surfaces of a representative sample of piping, piping elements, and components in the service air system exposed to condensation to manage loss of material. These components are required to be structurally sound to maintain the integrity of the safety class piping at primary containment penetration X-21. This includes components piping and valve body listed in LRA Table 3.3.2-14-25. Accordingly, the Periodic Surveillance and Preventive Maintenance Program provides aging management activities for each of the line items for which item 53 of CNS LRA Table 3.3.1 applies.

The Compressed Air Monitoring Program recommended in NUREG-1801 (GALL) Volume 2 Chapter XI.M24 primarily consists of air quality monitoring and leakage monitoring. The areas of the compressed air systems identified in LRA Tables 3.3.2-10 and 3.3.2-14-25 are in the service air portions of the system that contain no air dryers and in some cases are normally isolated from the rest of the system, such that air quality monitoring will not be an effective aging management activity.

The CNS Periodic Surveillance and Preventive Maintenance Program described in CNS LRA B.1.31 provides for periodic visual inspections or other non-destructive examination (NDE) techniques, among other elements. These are the same techniques included in other programs described in NUREG-1801 (GALL) Volume 2 that are credited to manage loss of material due to general and pitting corrosion on the internal surfaces of components. Accordingly, the Periodic Surveillance and Preventive Maintenance Program provides reasonable assurance that the effects of aging are managed such that these components will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation.

NRC Request: *RAI 3.4-1*

Background
On LRA page 3.4-79 of LRA Table 3.4.2-2-9, the applicant indicates that copper alloy >15% Zn or >8% Al valve bodies exposed to steam (internal) environment are susceptible to loss of

material. In the applicable AMR items for these components, the applicant credits only the Water Chemistry Control – BWR program for aging management.

<u>Issue</u>
The LRA defines steam as "treated water that has been converted to steam". Table IX.C in Volume 2 of the GALL Report, Revision 1 identifies components made from copper alloy containing >15% Zn or aluminum bronzes (copper-aluminum) alloy containing >8% Al may be susceptible to loss of material due to selective leaching. As a result, the GALL Report recommends that a program corresponding to GALL Report AMP XI.M35, "Selective Leaching of Materials", be used to manage loss of material due to selective leaching as a result of exposing these materials to a treated water environment.

<u>Request</u>
Please clarify if this material and environment combination is susceptible to loss of material due to selective leaching:

- *If yes, please justify the Water Chemistry Control – BWR program's ability for aging management without being augmented by the Selective Leaching program to verify loss of material due to selective leaching is not occurring.*

- *If not, please justify the Water Chemistry Control – BWR program's ability for aging management without being augmented by the One-Time Inspection program to verify loss of material is not occurring.*

<u>NPPD Response</u>:

Copper alloy >15% Zn or >8% Al valve body components exposed to a steam (internal) environment are susceptible to loss of material due to selective leaching. These components will be managed by the Selective Leaching Program which is consistent with NUREG-1801, Section XI.M33, Selective Leaching of Materials. LRA Table 3.4.2-2-9 is revised to add an associated line item (see Attachment 2, Change 29).

<u>NRC Request</u>: *RAI 3.3-4*

<u>Background</u>
In LRA Tables 3.2.2-01, 3.2.2-03, 3.2.2-04, 3.2.2-06, 3.2.2-07, 3.3.2-01, 3.3.2-04, 3.3.2-06, 3.3.2-07, 3.3.2-08, 3.3.2-12, 3.3.2-13, 3.3.2-14-16 and 3.3.2-14-20, the LRA states that numerous stainless steel, copper alloy and copper alloy >15%Zn or >8%Al components (which cite a note G), which are exposed to air – indoor (internal) do not have an aging effect requiring management, therefore an aging management program is not applicable.

<u>Issue</u>
The applicant did not provide the justification for determining these materials are not subject to an aging effect requiring management when exposed to air-indoor (internal). The staff is concerned the internal environment may contain contaminants and stagnant air which is not the same as freely circulating air-indoor on the external surface.

<u>Request</u>
Please describe in detail, the environmental conditions that exist in the internal environment in each of these components described above and how it compares to the external environment. Also please justify why these components do not experience an aging effect requiring management.

<u>NPPD Response</u>:

NPPD reviewed the line items that cite note "G" which are exposed to air-indoor (int) in LRA Tables 3.2.2-01, 3.2.2-03, 3.2.2-04, 3.2.2-06, 3.2.2-07, 3.3.2-01, 3.3.2-04, 3.3.2-06, 3.3.2-07, 3.3.2-08, 3.3.2-12, 3.3.2-13, 3.3.2-14-16 and 3.3.2-14-20. In all cases, the environmental conditions, both internal and external, are the same and are consistent with the definition of "Air-indoor uncontrolled " cited in NUREG-1801 Vol. 2 Table IX.D which states: "Indoor air on systems with temperatures higher than the dew point, i.e., condensation can occur but only rarely, equipment surfaces are normally dry." Consistent with NUREG-1801 Vol. 2 line items in Tables V.F, VII.J, and VIII.I and NUREG-1833, there are no aging effects for stainless steel and copper alloy components exposed to air – indoor uncontrolled.

<u>NRC Request</u>: *RAI 3.3.2-4*

<u>Background</u>
In LRA Tables 3.3.2-6, 3.3.2-12, 3.3.2-14-18, and 3.3.2-14-29, the applicant did not identify the type of plastic materials being used for the listed components.

<u>Issue</u>
Plastic materials have different materials properties that vary depending on chemical compositions which may or may not have an aging effect in indoor air (internal and external) environment.

<u>Request</u>
Please provide the specific type of plastic material used for the various components listed In LRA Tables 3.3.2-6, 3.3.2-12, 3.3.2-14-18, and 3.3.2-14-29 and the applicable aging effect for their given environment.

Please evaluate whether there are any degrading interactions with these plastic materials with the treated water and treated air environment and a justification of why these specific plastic materials do not require an aging effect requiring management or aging managing program.

<u>NPPD Response</u>:

As stated in EPRI Report 1010639, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, polyvinyl chloride (PVC) is a thermoplastic material composed of polymers of vinyl chloride. Manufactured from sodium chloride (NaCl) and natural gas, PVC is relatively unaffected by water, concentrated alkalis, and non-oxidizing acids, and oils. However, chemical attack is a potential aging mechanism for PVC and other thermoplastics located in outdoor and indoor environments due to exposure to ultra violet radiation (e.g., sunlight, fluorescent lighting), ozone, or ionizing radiation.

Each table where plastic is evaluated is discussed below.

<u>LRA Table 3.3.2-6, Fire Protection – Water System</u>, evaluates plastic tubing and valve body components exposed to treated air and indoor air. The exact type of plastic is not known but was selected for use by the original manufacturer in this application. The internal surface of plastic is unaffected by treated air; however, the external surface may experience the aging effect of change in material properties due to exposure to fluorescent lighting. Accordingly, LRA Section 3.3.2.1.6 and Table 3.3.2-6 are being revised (see Attachment 2, Changes 12 and 18).

<u>LRA Table 3.3.2-12, Plant Drains,</u> evaluates plastic hose components staged in a storage unit and used during a flooding event. The hose is exposed to indoor air and is not subjected to ultraviolet radiation. The plastic type is PVC. Since the internal and external surfaces of the component are not exposed to known stressors, there are no aging effects requiring management.

<u>LRA Table 3.3.2-14-18, Reactor Equipment Cooling [10 CFR 54.4(a)(2)]</u>, evaluates a plastic pump casing exposed to treated water and indoor air. The plastic type is PVC. The internal surface of PVC is unaffected by treated water; however, the external surface may experience the aging effect of change in material properties due to exposure to fluorescent lighting. Accordingly, LRA Section 3.3.2.1.14 and Table 3.3.2-14-18 are being revised (see Attachment 2, Change 24).

<u>LRA Table 3.3.2-14-29, Turbine Equipment Cooling [10 CFR 54.4(a)(2)]</u>, evaluates a plastic pump casing component exposed to treated water and indoor air. The plastic type is PVC. The internal surface of PVC is unaffected by treated water; however, the external surface may experience the aging effect of change in material properties due to exposure to fluorescent lighting. Accordingly, LRA Section 3.3.2.1.14 and Table 3.3.2-14-29 are being revised (see Attachment 2, Changes 15 and 26).

Other conforming LRA changes are made, as described in Attachment 2 (Changes 34 and 35).

NRC Request: *RAI 3.3.2-6*

Background
In LRA Tables 3.3.2-4, the applicant did not identify an aging effect requiring management or Aging managing program for a fiberglass silencer in an indoor air (external/internal) environment.

Issue
The staff reviewed the applicant's usage of fiberglass under an air-indoor (external/internal) environment. The applicant states that an air-indoor environment is on systems with temperatures higher than the dew point and condensation may occur but only rarely, equipment surfaces are normally dry. The staff finds this not acceptable because humidity is easily absorbed in fiberglass. Fiberglass absorbs and can expand microcracks within the matrix of the material and decrease its tenacity.

Request
Please provide justification as to why fiberglass under an air-indoor environment is acceptable for this component.

NPPD Response:

Fiberglass is a glass based material that, similar to glass, is highly resistant to corrosion in most environments especially an indoor air environment. No instances of fiberglass failure due to an aging effect in an air-indoor environment have been found in industry operating experience searches; therefore, no aging effects are identified for the fiberglass component (intake air silencer). This is consistent with section 3.3.2.3.11 of the Safety Evaluation Report (NUREG-1905) for license renewal of James A. FitzPatrick (ADAMS Accession Number ML080250372), where the NRC staff concluded that fiberglass in indoor-air (internal or external) is not susceptible to significant aging degradation. Accordingly, no aging management program is required for the fiberglass silencer.

NRC Request: *RAI B.1.15-10*

(Follow up to RAI B.1.15-4)

Background
Program Element 6 of NUREG-1801 Section X.M1 is concerning acceptance criteria. Under the CNS Fatigue Monitoring program, B.1.15 (CNS-RPT-LRD02, Revision 1), program element 6 subsection b states: "The Fatigue Monitoring Program acceptance criteria are that none of the transients exceeded the allowable numbers in USAR Table III-3-1 ..."

Issue
Clarification is deemed necessary, as described below.

Request
Questions (b) and (c) of RAI B.1.15-3 apply here. Please explain accordingly.

GALL Report Section X.M1 Element 6 requires maintaining fatigue usage below the design code limit considering environmental fatigue effects. CNS FMP Element 6 does not mention environmental fatigue effects. Please explain why.

NPPD Response:

This RAI was answered in a previous submittal[3].

NRC Request: *RAI 3.2-1*

Background
In each of the LRA Tables 3.2.2-7, 3.3.2-3, 3.3.2-4, 3.3.2-14-27, and 3.3.2-14-28, the applicant stated that no aging effect requiring management (AERM) was identified, and no aging managing program (AMP) was required, for one glass item (flow indicators or sight glasses) in gas (internal), condensation (external and internal), or sodium pentaborate (internal) environments. The AMR line items cite Generic Note G, which indicates that the environment is not addressed in the GALL Report for these components and materials.

Issue
The LRA does not identify the type of glasses in the five items and does not provide a technical basis for no AERM or AMP being applicable to these components.

Request
The staff requests further detail on the type of glasses in the table items that cite Generic Note G, and the resistance of those glasses to the specific environments to confirm that there are no aging effects requiring management. Also identify the specific gas environment for the glass flow indicators in Table 3.2.2-7 and 3.3.2-14-28.

NPPD Response:

Generic Note G was chosen for these line items because the exact environment is not in NUREG-1801 although glass in other environments is included in NUREG-1801 and identifies no aging effects. The basis for having no aging effects for glass is documented in NUREG-1833.

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[3] NLS2009049, Stewart B. Minahan to USNRC, "Response to Request for Additional Information for License Renewal Application – Safety RAI and Revised RAI," June 22, 2009 (ADAMS Accession Number ML091800024).

It states in NUREG-1833 on page 42 "To summarize, glass as a material is impervious to normal plant environments." As a result, no aging effects are identified for glass in any of the environments and additional bases are provided below for this conclusion.

Of the sight glasses in question, the flow indicator on the test tank in the standby liquid control system is exposed to the most aggressive of the environments in question. The test tank and sight glass are filled with room temperature sodium pentaborate (pH ~ 6.8–8.5) solution or plain demineralized water (pH ~ 6.0 to 7.0) during testing. This sodium pentaborate solution is an essentially neutral solution of room temperature treated water such that the sight glass will be unaffected, and as a result there are no aging effects requiring management. This is consistent with NUREG-1801 line item V.F-9 which concludes there are no aging effects for glass in a treated borated water environment, and with the NUREG-1833 conclusions on the resistance of glass to aging effects. The remaining environments of gas and condensation are much less aggressive, and as such, there are no aging effects requiring management for glass in these environments.

The flow indicators in LRA Table 3.2.2-7 are part of the hydrogen (H_2) concentration monitoring of the primary containment. These flow indicators have an internal environment of gas during power operations since primary containment is nitrogen-inerted. However, since nitrogen inerting is not present during non-power operations, the appropriate conservative internal environment is "air – indoor." This line item has been changed in the LRA (see Attachment 2, Change 10).

The flow indicators in LRA Table 3.3.2-14-28 are part of the standby nitrogen injection (SBNI) system of the primary containment and have an internal environment of nitrogen gas. These SBNI flow indicators are shown on drawing LRA-2084 at coordinates H-5 and H-8.

CNS operating experience with these material and environment combinations is consistent with the industry experience of no aging effects requiring management reflected in NUREG-1801 and EPRI Report 1010639, Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools.

<u>NRC Request</u>: *RAI 3.3.2.2.6-1*

Neutron Absorber Monitoring

<u>Background</u>
The GALL Report identifies loss of material/general corrosion and reduction of neutron-absorbing capacity as aging effects requiring management (AERM) for Boral in BWR treated water, and calls for further evaluation of a plant-specific aging management program.

Issue
CNS LRA Section 3.3.2.6, "Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion," states that, for Boral spent fuel storage racks exposed to a treated water environment, loss of material is an AERM and reduction of neutron-absorbing capacity is insignificant and requires no aging management. The second statement references CNS plant operating experience with Boral coupons inspected in 2002. The LRA does not address applicability of recent adverse operating experience (plant-specific and industry) with Boral.

The LRA states that management of loss of material is performed by the Neutron Absorber Monitoring and Water Chemistry Control – BWR Programs. However, the CNS LRA does not present sufficient specific plant information on how these programs will manage loss of material for Boral in the spent fuel pool.

Request

1. *To enable the staff to assess the adequacy of the existing Neutron-Absorber Monitoring and Water Chemistry Control Programs for managing aging effects for Boral:*

   a. *Discuss how the CNS Water Chemistry Control – BWR Program will be used to manage the loss of material for Boral spent fuel storage racks, what will be analyzed and measured; if the aluminum content of the spent fuel pool water is not monitored, provide the basis for the adequacy of the program in managing loss of material.*

   b. *Provide a program description and scope of the Neutron-Absorber Monitoring, including the structures and components, including Boral surveillance coupons, that will be under surveillance. Indicate whether the Boral panels and coupons in the CNS spent fuel pool are vented or not.*

   c. *Indicate the installation date of the Boral panels/racks in the CNS spent fuel pool.*

   d. *Describe how the loss of material and degradation of material will be monitored or inspected, specifically the methods, techniques (e.g., visual, weight, volumetric, surface inspection), frequency, sample size, data collection, timing and acceptance criteria.*

   e. *Discuss the correlation between measurements of the physical properties of Boral coupons and the integrity of the Boral panels in the storage racks.*

   f. *Identify the subcritical margin used in the criticality analysis. Describe how the program acceptance criteria account for potential degradation between surveillance periods.*

g. *For the CNS Boral coupon samples:*

i. *Identify the quantity and location of coupons relative to the spent fuel racks during the license renewal period.*

ii. *Describe how the coupons are mounted and whether they are fully exposed to the spent fuel pool water.*

iii. *Describe the specific testing that will be done for determining the Boral Boron-10 areal density, verifying surface corrosion (if any) and examining for blister formation.*

iv. *After removal from the pool for inspection will the coupons be inserted back at the same locations in the pool?*

h. *Please describe how the results from the inspections of the Boral coupons will be monitored and trended, including frequency and sample size (e.g., the number of coupons examined at each surveillance).*

i. *Please describe the corrective actions that would be implemented if coupon test results are not acceptable.*

j. *Please discuss the CNS operating experience applicable to the Boral panels and coupons, including:*

i. *Coupon descriptions, parameters tested or inspected, procedures used, results and conclusions for the 1982 and 1992 inspections and tests and any others, including:*

a) *What was the location of coupons relative to the spent fuel racks?*

b) *How were the coupons mounted and were they fully exposed to the spent fuel pool water?*

c) *What specific testing for determining the Boral Boron-10 areal density, verifying surface corrosion (if any) and examining for blister formation?*

d) *After removal from the pool for inspection were the coupons inserted back at the same locations in the pool?*

ii. *Describe the findings from these inspections, in particular any adverse findings, such as blistering or swelling noted in some coupon inspections.*

2. *In September 2003, inspection of Boral test coupons at Seabrook Nuclear Station revealed bulging and blistering of the aluminum cladding. Blistering and/or bulging on Boral coupons has also been noted at Three Mile Island and Beaver Valley.*

   a. *Please discuss the impact that these findings, along with any relevant findings at CNS, have on the continued functionality of Boral at CNS.*

   b. *Since formation of blisters may affect the efficiency of the Boral panels to attenuate neutrons (through flux trap formation) and may cause deformation of the fuel cells, please justify the basis for concluding that blistering will not be a safety concern at CNS.*

3. *With recent industry and plant-specific operating experience indicating conditions that could ultimately lead to reduction in neutron absorbing capacity of Boral at CNS, and the GALL Report listing reduction in neutron absorbing capacity as an AERM for Boral:*

   a. *Justify why reduction of neutron absorption capability has not been identified as an aging effect requiring management (AERM) for the Boral materials used in the CNS spent fuel pool storage racks, particularly when loss of material has been identified as an AERM for this material.*

   b. *Describe how the neutron-absorbing capacity and degradation of material will be monitored, including a description of the parameters, calculations, and acceptance criteria.*

   c. *Clarify the applicability of the LRA Section 3.3.2.2.6 references, BNL-NUREG-25582 and NUREG-1787 to the CNS program for managing reduction of neutron-absorbing capacity due to sustained irradiation of Boral, considering findings from the CNS coupon surveillance program and those at other plants.*

NPPD Response:

1.a. As indicated in LRA Section B.1.39, the Water Chemistry Control – BWR Program minimizes the potential for loss of material by limiting the levels of contaminants that could cause loss of material. The LRA notes that the program is consistent with the program described in NUREG-1801, Section XI.M2, "Water Chemistry." The program relies on monitoring and control of water chemistry based on EPRI Report 1008192 (BWRVIP-130). As stated in NUREG-1801, Section XI.M2, the EPRI guidelines include recommendations for controlling water chemistry in the spent fuel pool. Spent fuel pool parameters monitored include conductivity, chloride content, sulfate content, sodium content, silica content, total organic carbon, and total activity. The One-Time Inspection Program, described in LRA Section B.1.29, includes inspections to verify the effectiveness of the Water Chemistry Control – BWR Program by confirming that unacceptable loss of material is not occurring. The combination of Water Chemistry Control – BWR Program and One-Time Inspection Program is consistent with NUREG-1801, Volume 2 line item VII.A4-5 for managing loss of material of aluminum in treated water.

Boral sample coupons are periodically inspected, measured, and weighed to determine if degradation is occurring, in accordance with the Neutron Absorber Monitoring Program described in LRA Section B.1.23. These activities provide additional assurance that loss of material that could impact the Boral intended function will be adequately managed without reliance on monitoring for aluminum content in the spent fuel pool water.

1.b. The Neutron Absorber Monitoring Program is a plant-specific program described in LRA Section B.1.23 in terms of the program elements specified in NUREG-1800, Section A.1.2.3. The program relies on visual inspection of representative coupon samples mounted in surveillance assemblies located in the spent fuel pool to monitor performance of the absorber material without disrupting the integrity of the storage system. As stated in LRA Section B.1.23, the Neutron Absorber Monitoring Program scope includes all Boral in the CNS spent fuel pool.

Three types of sample coupons are used. The first coupon type is galvanic, consisting of a plate of 304 stainless steel bolted to a plate of aluminum, which simulates the rack, sub-base, and seismic bracing materials. The other two coupon types are Boral, consisting of a core (35% boron carbide by weight and 65% aluminum) clad on both sides with aluminum. These coupons simulate the plates used between the rows of fuel cells for reactivity control. One type of Boral coupon is seal welded on all edges. The other type is seal welded on three sides only, allowing the core material to be exposed to the spent fuel pool water. This coupon type simulates Boral material being exposed to the spent fuel pool environment if that were to occur in the panels, and is also known as a "vented" design. The Boral panels in the spent fuel pool are seal welded on all edges and thus not vented.

1.c. The Boral panels in the spent fuel pool were installed during January and February 1979.

1.d. All coupons are inspected during each surveillance which occurs once every eight years. The coupons are dried using a welding oven and allowed to cool.

Galvanic coupons are weighed and photographed, and then disassembled. The disassembled coupons are visually examined, photographed, and reassembled.

Boral coupons are weighed, visually inspected, and photographed. Thickness measurements are taken at three points along the length of the coupon. For the vented coupons, a measurement of the Boral distance from the unsealed edge is taken. The two control coupons (from outside the spent fuel pool environment) are inspected at the same time for comparison.

Inspection data is collected using a calibrated pan balance (for weight) and a micrometer (for thickness and length) and recorded on data sheets. Visual inspections check for signs of loss of material, swelling, and blistering. Results of visual inspections are documented and evaluated to ensure that the intended function is maintained during the period of extended operation.

1.e. There is direct correlation between physical properties measured on the Boral coupons and those of the Boral panels in the storage racks due to the material and physical similarities (e.g., seal weld design) between the coupons and the panels in the storage racks.

1.f. As stated in Section X-3.2 of the CNS Updated Safety Analysis Report, the high density spent fuel storage racks are designed to maintain spent fuel assemblies in a subcritical configuration having a keff $\leq$ 0.95 for all normal and abnormal configurations. Further investigation is directed by the surveillance procedure if loss or degradation of material are noted. CNS Boral coupon surveillance results have not identified any significant loss of material between surveillance periods; in fact, the results have been used to increase the inspection interval from four years to eight years. This is consistent with industry experience. Findings from future coupon inspections will be evaluated to ensure that the surveillance period remains appropriate.

1.g.i. The coupon inventory is as follows:

- 17 Boral coupons inside the spent fuel pool (3 vented and 14 unvented)
- 2 control Boral coupons outside the spent fuel pool (1 vented and 1 unvented)
- 2 galvanic coupons inside the spent fuel pool

1.g.ii. The coupons inside the spent fuel pool are mounted in the surveillance assembly with brackets at both ends of each coupon. The assembly has four sides and is open to the spent fuel pool water, fully exposing the coupons to the spent fuel pool water.

1.g.iii. Specific activities for managing the effects of aging are described in the response to Request 1.d. Evaluation for change in material properties (reduction of neutron-absorbing capacity) such as Boron-10 areal density measurement is not done due to operating experience from neutron attenuation testing in 1982 and 1992 that indicated no loss in neutron absorption capability.

1.g.iv. After completion of inspection, the coupons are returned to their original locations.

1.h. As described in the response to Request 1.d., all coupons are inspected during each surveillance. The surveillance frequency is once every eight years, based on operating experience. The inspection results are evaluated and compared with previous results.

1.i. As indicated in LRA Section B.1.23, corrective actions are determined in accordance with the CNS Correction Action Program. Refer to LRA Section B.0.3 for further discussion of the Corrective Action Program. Corrective actions for unacceptable coupon inspection results could include coupon evaluation by outside experts, rack inspection, and rack "blackness" testing, based on the surveillance findings.

1.j. Results from CNS Boral coupon surveillance inspections in 1982 and 1992 were initially unacceptable. Upon further review, they were not found to be indicative of conditions which would affect the panels themselves as described below. No significant issues have occurred with the coupons such that a loss of the neutron absorber material was suspected. Past surveillances have noted minor surface indications and minor changes in measured parameters.

<u>1982 Surveillance</u>
During a normal surveillance inspection, two of twenty Boral coupons were discovered to be swollen. These coupons had been in a fuel assembly storage location inside the spent fuel pool, mounted in the surveillance assembly with brackets at both ends of each coupon and fully exposed to the water.

These two swollen Boral coupons were sent to the University of Michigan for evaluation, along with an additional non-swollen coupon from the spent fuel pool and one control coupon. The parameters tested and procedures included:

- Boral core condition examination via x-ray radiography
- width, length, thickness, and volume via caliper for width and length, micrometer for thickness, and water displacement for volume
- determination of loss of neutron absorber via neutron radiography
- determination of loss of neutron absorber via neutron attenuation testing
- determination of type of gas causing swelling via extraction of gas samples and determination of gas pressure
- determination of leakage via leak test at various pressures
- condition of Boral core material via visual examination

Results of the 1982 evaluations were as follows:

- The neutron shielding performance for the swollen samples exceeded the minimum requirements for a new Boral panel.
- No surface corrosion or blister formation was noted.
- The main constituent of the entrapped gas was hydrogen, with an internal gage pressure of less than 3 psi.

An internal gage pressure of 50 psi was applied to the sample without causing swelling. Therefore, the conclusion was that the swelling was due to internal mechanical failure of the coupon combined with water entrained in the failed coupon at the time of the final factory leak test prior to shipment. The mechanical failure was ascribed to the shearing required to reduce the samples to a smaller than original size prior to shipment. The swelling did not indicate a condition which would affect the panels themselves as they did not undergo the same shearing process. The recommendation was to return the samples to the pool and continue normal surveillance testing. The coupons were returned to their original locations, with the exception of one which had been destructively examined.

<u>1992 Surveillance</u>
During a normal surveillance inspection, one Boral coupon was discovered swollen. This coupon had been in a fuel assembly storage location inside the spent fuel pool, mounted in the surveillance assembly with brackets at both ends and fully exposed to the water.

This swollen Boral coupon was evaluated by Holtec International, along with an additional non-swollen coupon and one galvanic coupon. The parameters tested and procedures included:

- Boron-10 content of swollen Boral coupon via neutron attenuation and neutron radiography
- width, length, thickness, and weight of swollen Boral coupon via caliper for width and length, micrometer for thickness, and balance for weight
- surface condition of swollen Boral coupon via visual examination
- surface condition of galvanic coupon via visual examination with dye penetrant to highlight any surface defects

Results of the 1992 evaluations were as follows:

- The swollen coupon showed swelling typical of a sealed Boral sample when water leaks into the enclosed space. The bulges observed on the coupon were considered unique to the coupon and not representative of the Boral panels in the racks.

- Neutron attenuation testing and radiography showed no loss of neutron absorber material and no indication of non-uniform distribution of the boron-10 in the absorber material.
- No surface corrosion or blister formation was noted on the swollen Boral coupon.
- No significant galvanic corrosion was noted on the galvanic coupon.

The conclusion was that the swelling noted was due to a small leak in the coupon. This was not considered representative of the racks, and the Boral in the racks was considered capable of continuing to perform its function. The coupons were returned to their original locations.

2.a. The findings at Seabrook Nuclear Station, Three Mile Island, and Beaver Valley had no impact on the functionality of Boral at CNS. The Neutron Absorber Monitoring Program remains capable of ensuring the continued functionality of Boral at CNS.

2.b. Blistering will be detected and managed through the inspection activities of the CNS aging management program. In accordance with the Neutron Absorber Monitoring Program described in LRA Section B.1.23, Boral test coupons are periodically inspected, measured, and weighed to determine if degradation of any material is occurring (e.g., corrosion, blistering, swelling). Any indication of degradation will be documented in the corrective action program and appropriate actions taken. This provides reasonable assurance that the Boral neutron absorber will remain capable of fulfilling its license renewal intended function. Industry and plant-specific operating experience for this aging management program are routinely evaluated for impact on the Boral program. The inspection and testing of Boral coupons as specified in the Neutron Absorber Monitoring Program will ensure that blistering and swelling will not affect the ability of the Boral panels to perform their intended function.

3.a. Reduction of neutron absorption capability has not been identified as an AERM for the Boral materials used in the CNS spent fuel pool storage racks due to operating experience from neutron attenuation testing in 1982 and 1992 that indicated no loss in neutron absorption capability. In addition, a review of recent industry and plant-specific operating experience indicates no loss of neutron absorbing capability for Boral panels due to loss of material (including corrosion and blistering). A condition that leads potentially to a reduction in neutron absorbing capacity due to degradation of material (e.g., corrosion, blistering, swelling) would first yield physical manifestations that would be detected through the Neutron Absorber Monitoring Program described in LRA Section B.1.23.

3.b. A condition that leads potentially to a reduction in neutron absorbing capacity due to degradation of material (e.g., corrosion, blistering, swelling) would first yield physical manifestations that would be detected through the Neutron Absorber Monitoring Program described in LRA Section B.1.23. Appropriate corrective actions would be taken based on the physical manifestations observed. Typical corrective actions for unacceptable coupon inspection results include coupon evaluation by outside experts, rack inspection, and rack "blackness" testing.

3.c. The references in LRA Section 3.3.2.2.6 remain applicable to CNS. As documented in Section 3.5.2.4.2 of the license renewal SER for VC Summer (NUREG-1787), the NRC staff accepted the position that Boral does not degrade as a result of long-term exposure to radiation. The potential aging effects resulting from sustained irradiation of Boral were evaluated by the staff (in BNL-NUREG-25582, dated January 1979) and determined to be insignificant. The findings at CNS and other facilities are not inconsistent with the staff's evaluation of the effects of sustained irradiation of Boral. Degradation observed in recent industry operating experience has not been attributed to irradiation of Boral.

<u>NRC Request</u>: *RAI 2.3.3.6-1*

Section 2.1 "Fire Protection System Clean Water Supply," of the CNS Safety Evaluation Report, dated April 29, 1983, states that "...A clean water fire protection system is being installed at CNS which upgrades the existing system that takes suction from the Missouri River..." LRA drawing LRA-2016-SH01A-0 shows the water treatment system as being in the scope of the license renewal and subject to an AMR. This drawing show the 15,000-gallon fire system flushing tank and associated components at locations A10, A11, B10, and B11 as out of scope (i.e., not colored in red). The staff requests that the applicant verify whether the 15,000-gallon fire system flushing tank and associated components are in the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with 10 CFR 54.21(a)(1). If they are excluded from the scope of license renewal and not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

<u>NPPD Response</u>:

As stated in LRA Section 2.3.3.6, the dedicated clean water supply for fire protection is provided by two 500,000-gallon tanks. These tanks are the only fire water supply tanks credited for 10 CFR 50.48 requirements. The flushing tank shown on drawing LRA-2016-SH01A-0 contains treated water that is used to flush the fire water system should the screen wash pumps or the backup electric fire pump (1C), which use river water, be used to supply fire water. Use of these backup river water sources is not credited for 10 CFR 50.48. This 15,000 gallon flushing tank and its associated components are not credited to meet 10 CFR 50.48 requirements and have no other functions that meet 10 CFR 54.4(a) scoping requirements and are therefore not in the scope of license renewal.

<u>NRC Request</u>: *RAI 2.3.3.6-2*

The LRA drawing LRA-2016-SH02-0 shows fire water system valves and nozzles at locations F9, G10, and H9 as out of scope (i.e., not colored in red). The staff requests that the applicant verify whether the above fire hose connections are in the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with 10 CFR 54.21(a)(1). If these hose connections are excluded from the scope of license renewal and not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

<u>NPPD Response</u>:

The non-highlighted fire water piping, valves, nozzles and associated components shown on drawing LRA-2016-SH02-0 (coordinates F9, G10, H9) are normally isolated from the remainder of the fire water system and are part of the test headers used for system and component testing. They do not provide a function that supports fire water system 10 CFR 50.48 requirements and are therefore not in the scope of license renewal.

<u>NRC Request</u>: *RAI 2.3.3.6-3*

Section 4.3.1.4, "Interior Hose Stations," of the CNS Safety Evaluation Report, dated May 23, 1979, states that "...Fifty-four interior stations are strategically located through the plant..." The staff requests that the applicant verify whether all fifty-four hose stations are in the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with 10 CFR 54.21(a)(1). If any is excluded from the scope of license renewal and not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

<u>NPPD Response</u>:

There are sixty-four interior stations strategically placed throughout the plant (where safety-related equipment is located) that are in scope, and twenty-four stations that are not in scope. The twenty-four stations not in scope are located in areas such as outbuildings (warehouses, security building, communication building, training building) and office buildings that are not required to meet 10 CFR 50.48 requirements.

<u>NRC Request</u>: *RAI 2.3.3.6-4*

Section 4.3.1.6, "Foam Suppression System," of the CNS Safety Evaluation Report, dated May 23, 1979, states that "...The licensee will provide an automatic foam suppression system over the diesel fire pump in the intake structure and manual foam capability to include inductors and foam concentration in a readily available location." The staff requests that the applicant verify whether the automatic foam suppression system over the diesel fire pump is in the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with

10 CFR 54.21(a)(1). If automatic foam suppression system and associated components are excluded from the scope of license renewal and not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.

NPPD Response:

There is no longer a diesel fire pump or an associated automatic foam suppression system in the intake structure. The diesel fire pump in the intake structure was removed (as authorized by License Amendment 82, dated April 29, 1983) to comply with the requirements of 10 CFR 50 Appendix R. The foam suppression system was also removed since it was no longer required with the removal of the diesel fire pump.

NRC Request: *RAI 2.3.3.6-8*

LRA Section 2.3.3-6, states that, "...The FP – water system includes water storage tanks, one diesel-driven 3000 gpm fire pump, one electric-driven 3000 gpm fire pump, one 30 gpm jockey fire pump..." "...Two above-ground fire protection water storage tanks, each having a gross capacity of 500,000 gallons of water, provide the dedicated water supply of fire protection use..." "...The tanks supply water to two fire pumps located in the fire pump house, one electric-driven and one diesel-driven. A third fire pump takes suction directly from the Missouri River and provides a backup supply to the system..." LRA Section 2.3.3.6 discusses requirements for the fire water supply system but does not mention trash racks and traveling screens for the backup fire pump suction water supply. Trash racks and traveling screens are typically located upstream of the fire pump suctions to remove any major debris from the fresh or raw water to prevent clogging of the fire protection water supply system. Trash racks and traveling screens are typically considered to be passive, long-lived components. Both the trash racks and traveling screens are located in a fresh or raw water/air environment and are typically constructed of carbon steel. Carbon steel in a fresh or raw water environment or water/air environment is subject to loss of material, pitting, crevice formation, and microbiologically influenced corrosion and fouling. Explain the apparent exclusion of the trash racks and traveling screens that are located upstream of the fire pump suctions from the scope of license renewal in accordance with 10 CFR 54.4(a) and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

NPPD Response:

The Safety Evaluation for License Amendment 82, dated April 29, 1983, approved the upgrade of the electric and diesel-driven fire pump suctions from the Missouri River to a clean water source, and established the as-modified system as the basis for compliance with 10 CFR 50 Appendix R and Branch Technical Position 9.5-1 Appendix A. The third fire pump is a non-credited backup to these fire pumps. Having no 10 CFR 54.4 (a)(1), (a)(2), or (a)(3) functions, it is not in the scope of license renewal. Thus the associated nonsafety-related components (trash racks and traveling screens) that support the third fire pump are also not in scope or subject to aging management review.

NRC Request: *RAI 2.1-1*

Background
10 CFR 54.4(a)(2) requires that all nonsafety-related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i-iii) be included within the scope of license renewal.

LRA Section 2.1.1.2.2, "Physical Failures of Nonsafety-Related SSCs," states:

> *"The review utilized a spaces approach for scoping of nonsafety-related systems with potential spatial interaction with safety-related SSCs. The spaces approach focuses on the interaction between nonsafety-related and safety-related SSCs that are located in the same space. A "space" is defined as a room or cubicle that is separated from other spaces by substantial objects (such as wall, floors, and ceilings). The space is defined such that any potential interaction between nonsafety-related and safety-related SSCs, including flooding, is limited to the space. Nonsafety-related systems that contain water, oil, or steam with components located inside structures containing safety-related SSCs are potentially in scope for possible spatial interaction under criterion 10 CFR 54.4(a)(2). These systems were evaluated further to determine if system components were located in a space such that safety-related equipment could be affected by a component failure."*

Issue
During the scoping and screening methodology audit, the staff performed a walk-down of the turbine building. The staff determined that the basement portion of the turbine building, which contains high-energy, fluid-filled, nonsafety-related systems, was not included within the scope of license renewal although there is a direct open path from the basement to higher elevations, which contain safety-related SSCs.

Request
The staff determined that the nonsafety-related, fluid-filled SSCs were not located in a separate space from safety-related SSCs as described in LRA Section 2.1.1.2.2. The staff requests that the applicant describe the methods used and the basis for conclusions, in determining to not include nonsafety-related, fluid-filled SSCs within the scope of license renewal when located in the same space as safety-related SSCs.

As part of your response, please address the extent of condition and additional scoping reviews performed for nonsafety-related SSCs located within the same space as safety-related SSCs, with the potential to affect safety-related SSCs. List any additional SSCs included within the scope of *license renewal as a result of the review, and list those structures and components for which aging management reviews were conducted. For each structure and component, describe the aging management programs, as applicable, to be credited for managing the identified aging effects.*

NPPD Response:

The CNS turbine building elevation 882' (basement) contains no safety-related components. Components in the turbine building basement are assigned to the following systems.

Auxiliary Condensate Drain (ACD)
Air Removal (AR)
Condensate Drain (CD)
Condensate Makeup (CM)
Carbon Dioxide (CO2)
Circulating Water (CW)
Demineralized Water (DW)
Extraction Steam (ES)
Non-radioactive Floor Drains (FDN)
Fire Protection (FP)
Hydrogen (H2)
Heating and Ventilation (HV)
Instrument Air (IA)
Turbine Generator Lube Oil – Mechanical (LO)
Main Condensate (MC)
Main Steam (MS)
Off Gas (OG)
Optimum Water Chemistry (OWC)
Reactor Feedwater (RF)
Reactor Feedwater Pump and Turbine Lube Oil (RFLO)
Radwaste (RW)
Service Air (SA)
Sewage Treatment (ST)
Service Water (SW)
Turbine Equipment Cooling (TEC)

Some high energy components in the turbine building basement could release fluids that may theoretically reach equipment in upper elevations through maintenance openings. Even though a failure of this type is highly unlikely and represents a significant operating event that would be discovered prior to a loss of intended function for safety-related components, the following high energy systems and associated component types located in the turbine building basement are added to the components considered subject to aging management review based on the criterion of 10 CFR 54.4(a)(2).

Extraction Steam (ES) – expansion joints, piping, rupture disk, thermowell, trap, and valve body. The component types expansion joint, piping, thermowell, and valve body are already evaluated in LRA Table 3.4.2-2-5, Extraction Steam System [10 CFR 54.4(a)(2)]. The LRA is amended to add component types rupture disk and trap to the extraction steam system evaluation as shown in Attachment 2, Changes 1 and 28.

Main Steam (MS) – flow element, piping, strainer housing, trap, and valve body. The component types flow element, piping, strainer housing, and valve body are already evaluated in LRA Table 3.4.2-2-9, Main Steam System [10 CFR 54.4(a)(2)]. The LRA is amended to add component type trap to the main steam system evaluation as shown in Attachment 2, Changes 2 and 29.

Reactor Feedwater (RF) – flow element, piping, pump casing, restriction orifice, strainer housing, trap, turbine casing, and valve body. The component types piping and valve body are already evaluated in LRA Table 3.4.2-2-10, Reactor Feedwater System [10 CFR 54.4(a)(2)]. The LRA is amended to add component types flow element, pump casing, restriction orifice, strainer housing, trap, and turbine casing to the reactor feedwater system evaluation as shown in Attachment 2, Changes 3 and 30.

The remaining systems with components located in the turbine building basement are low energy systems whose failure cannot prevent satisfactory accomplishment of functions identified in 10 CFR 54.4(a)(1)(i), (ii), or (iii). With the exception of the air removal, hydrogen, and sewage treatment systems, all the systems listed above are already in scope for 10 CFR 54.4(a)(2). However, components assigned to these systems and located in the turbine building basement are not subject to aging management review.

NRC Request: *RAI 2.1-2*

Background
10 CFR 54.4(a)(2) requires that all nonsafety-related systems, structures, and components (SSCs) whose failure could prevent satisfactory accomplishment of any of the functions identified in 10 CFR 54.4(a)(1)(i-iii) be included within the scope of license renewal

LRA Section 2.1.2.1.2, "Identifying Components Subject to Aging Management Review Based on Support of an Intended Function for 10 CFR 54.4(a)(2)," states:

> *"Appropriate LRA drawings for the systems were reviewed to identify safety-to-nonsafety interfaces. Nonsafety-related components connected to safety-related components were included to the first seismic anchor or base-mounted component. A seismic anchor is*

defined as hardware or structures that, as required by the analysis, physically restrain forces and moments in three orthogonal directions. Scope was typically determined by the bounding approach, which included piping beyond the safety-to-nonsafety interface up to a base-mounted component, flexible connection, or the end of a piping run (such as a vent or drain line). Also, piping isometrics were used to identify seismic anchors when required to establish scope boundary. This is consistent with the guidance in NEI 95-10, Appendix F."

Issue
The staff determined that the license renewal drawings identified, by color coding, certain piping as being within the scope of license renewal in accordance with 10 CFR 54.4(a)(1) up to a room or building boundary (wall). However, the drawing does not indicate that the attached piping on the opposite side of the wall, is within the scope of license renewal (the piping is not color coded to indicate being within the scope of license renewal in accordance with 10 CFR 54.4(a)(1) or 10 CFR 54.4(a)(2)).

Request
The staff requests that the applicant address whether all nonsafety-related piping, attached to safety-related piping at room boundaries and extending beyond the room which contains the safety-related piping, was included within the scope of license renewal up to and including a seismic anchor or bounding condition.

As part of your response, please address the extent of condition and additional scoping reviews performed for nonsafety-related SSCs attached to safety-related SSCs. List any additional SSCs included within the scope of license renewal as a result of the review, and list those structures and components for which aging management reviews were conducted. For each structure and component, describe the aging management programs, as applicable, to be credited for managing the identified aging effects.

NPPD Response:

NPPD reviewed all LRA drawings and applicable isometric drawings to verify that nonsafety-related piping attached to safety-related piping beyond room boundaries was included within the scope of license renewal up to and including a seismic anchor or bounding condition (base-mounted component, flexible connection, or the end of a piping run). The review revealed that seismic anchors or bounding conditions at the nonsafety-related to safety-related interface are located within room boundaries as shown on the LRA drawings and are included within the yellow highlighting as in scope and subject to aging management review per the criterion of 10 CFR 54.4(a)(2).

There are also locations on the LRA drawings where components are highlighted, but not in yellow (10 CFR 54.4(a)(2)), terminating at a boundary wall. For these instances, all the components required to provide structural support are within the highlighting and are in scope and subject to aging management review per the criteria of 10CFR 54.4 (a)(1). Therefore, components beyond the boundary wall are not in scope and subject to aging management review for structural support.

NRC Request: *RAI 3.1-2*

Background
In each of LRA Sections 3.2.2.2.1, 3.3.2.2.1 and 3.4.2.2.1, an identical statement which reads "Evaluation of this TLAA is addressed in Section 4.3." is included.

Issue
It is unclear to the staff whether LRA Section 4.3 has covered fatigue TLAA for the components under groups of Engineered Safety Features (ESF), Auxiliary Systems (AUX), and Steam and Power Conversion (SPC), corresponding to the three sections listed above, as the applicant claimed. At least, the information provided in LRA Section 4.3 is inadequate or insufficient to enable readers to identify which of the three groups each TLAA is associated with.

Request
Please list the components (or identify subsections under LRA Section 4.3) that have fatigue TLAA analyzed for ESF. Similarly list the components evaluated for AUX, and SPC. If none is identified in any of the groups, explain the reason for omission and correct inconsistency for the LRA sections listed in Background.

NPPD Response:

To assess the effects of fatigue, components in CNS ESF, AUX, and SPC systems were reviewed in the categories of piping and non-piping components. The results of this review are shown in the aging management review results Tables 3.2.2-X, 3.3.2-X and 3.4.2-X. Components for which metal fatigue is addressed as a time-limited aging analysis (TLAA) are all piping components. No fatigue TLAA were identified for non-piping components as discussed below.

The ESF, AUX, and SPC system piping had no cumulative usage factors calculated as part of their design, but rather used stress range reduction factors based on the expected number of cycles to account for fatigue effects. The CNS ESF, AUX, and SPC system piping analyses used a stress range reduction factor of 1.0 (i.e., no stress reduction) based on the systems seeing less that 7000 cycles. NPPD has reviewed the operation of these systems and confirmed that they will not exceed 7000 cycles through the period of extended operation. Thus, NPPD considers the fatigue TLAA for the piping in these non class 1 systems valid through the period of extended operation as stated in LRA Section 4.3.2.

Non-piping components in the ESF, AUX, and SPC systems were reviewed individually. The components identified in the aging management review reports as potentially subject to fatigue were the RHR heat exchanger shells and tubes, the RHR pump casings, the high pressure coolant injection (HPCI) turbine casing, the reactor core isolation cooling turbine casing, the emergency diesel generator (EDG) expansion joint, the EDG heat exchanger housing and tubes, and the exhaust of the diesel driven fire pump. CNS records were searched and design codes were reviewed, and no fatigue analysis for any of these components was identified. Thus CNS has no fatigue analyses for non-class 1 components, and therefore has no associated TLAA for components other than piping system components.

NRC Request: *RAI 3.1-3*

Background
LRA Table 3.3.2-14-2 lists the AMR results for components in the AUX group, in which 16 of the 18 TLAA items identified being consistent with the GALL Report were simultaneously cited with Note C and Note 305. In addition, the applicant also correlated these items to GALL Vol. 2 items VIII.B1-10 and VIII.B2-5.

Issue
Note 305 states that "... Although this environment does not directly compare with any NUREG-1801 defined environment, it is considered the equivalent of steam or treated water for the evaluation of cracking due to fatigue." Comparing the environments indicated in GALL VIII.B1 and VIII.B2 against the environments indicated in the AMR lines of interest, the staff found that both the GALL and the LRA essentially mentioned the same environments: treated water and steam. Furthermore, GALL Table 2 items VIII.B1 is intended for PWR plants but CNS is a BWR plant. Additionally, Note C and Note 305 contradict each other because Note C says that everything is consistent with the GALL, including environment, except for the component while Note 305 says "environment does not directly compare with any NUREG-1801 defined environment"

Request

(a) *Provide basis regarding using Note 305 for the 16 items mentioned in Background.*

(b) *Provide basis for correlating components to the GALL VIII.B1 items which is for PWRs, when CNS is a BWR plant.*

(c) *Note C and Note 305 appear to be conflicting. Justify using these two notes for the same item.*

NPPD Response:

(a) The environments of treated water and steam listed in LRA Table 3.3.2-14-2 are not the same as the NUREG-1801 definitions of treated water and steam. Footnote 1 to LRA Table 3.0-1 explains the meaning of "treated water" (and by extension, steam) as used in the Table 2 presentation of aging management review results. The footnote also explains why plant specific notes are used to clarify the definition of treated water or steam. Note 305 is applied in LRA Table 3.3.2-14-2 because the treated water and steam in the auxiliary steam system are controlled by the Water Chemistry Control – Auxiliary Systems Program, so they are not the same as the NUREG-1801 defined treated water and steam environments, which specify the Water Chemistry Control – BWR Program.

(b) The comparisons to NUREG-1801 line item VIII.B1-10 will be changed to VIII.B2-5 for the seven lines in LRA Table 3.3.2-14-2. Since these two NUREG-1801 line items are otherwise identical, no other changes result. See Attachment 2, Change 22, for an itemization of these LRA changes.

The comparisons to NUREG-1801 line item VIII.B1-10 will also be changed to VIII.B2-5 for two similar lines in LRA Table 3.3.2-14-11. Additionally, Note 305 will be added to these two lines because the steam environment in the heating and ventilation system is the same as the auxiliary steam system environment. See Attachment 2, Change 23, for an itemization of these LRA changes.

(c) The applicability of the aging effect of cracking due to fatigue in auxiliary systems is dependent on system temperature rather than the specific chemistry of the environment. Minor chemistry differences between water and steam controlled by the Water Chemistry Control – Auxiliary Systems Program or by the Water Chemistry Control – BWR Program, have insignificant impact on fatigue. As stated in Note 305, the auxiliary system steam and treated water environments are considered the equivalent of (and thus, consistent with) steam or treated water as defined by NUREG-1801 for the evaluation of cracking due to fatigue. Therefore, the aging management review results presented in the LRA table line are consistent with those in NUREG-1801 except for the component type, and Note C is applicable.

NRC Request: *RAI B.1.10-2*

Background
Industry experience has shown that the suppression chamber, or torus, in BWR Mark I Containments may be susceptible to accelerated corrosion rates.

Issue
Plant-specific operating experience at CNS includes pitting and accelerated corrosion throughout the torus.

Request
Discuss any plans to recoat the torus prior to or during the period of extended operation to reduce the corrosion rate.

NPPD Response:

NPPD does not have firm plans to recoat the torus. However, NPPD will continue to inspect the torus prior to and during the period of extended operation as required by ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWE. The indications found during the inspections will continue to be evaluated to determine the need for corrective actions including, but not limited to, recoating. The last recoating of areas within the torus was the result of the 2005 torus inspection.

NRC Request: *RAI B.1.10-3*

Background
Industry experience has shown that the suppression chamber, or torus, in BWR Mark I Containments may be susceptible to accelerated corrosion rates.

Issue
Plant-specific operating experience at CNS indicates that corrosion rates and available corrosion margins may be an issue during the period of extended operation.

Request
Discuss the process for ensuring aging effects on the primary containment are captured in a timely fashion and the containment structure remains within code and design allowable values. Also explain how the IWE code required inspection results are recorded, evaluated, and/or repaired as part of the Containment Inservice Inspection Program.

NPPD Response:

Under the Containment Inservice Inspection Program, NPPD performs examinations of the torus in accordance with ASME Section XI as required per 10 CFR 50.55a. NPPD has performed examinations of the entire underwater portion of the torus in accordance with the requirements for Category EC as defined in IWE-1240 and IWE-2500-1 due to minor surface pitting that has been identified after the first ASME Section XI examination in 2001.

The examination results are recorded on examination data sheets by VT examiners that meet the qualification requirements of ASME Section XI. NPPD uses conservative site-specific criteria developed to evaluate pits identified during the examinations. The site-specific criteria are established to provide thresholds for immediately recoating the pits or for notifying engineering for additional evaluation. The pre-established thresholds are conservative and well above the minimum design thickness of the torus shell and penetration areas. Pits that have been identified since the first IWE required inspection are tracked under the CNS Containment Inservice Inspection Program. To date, no pits have been identified that required Code repair.

NRC Request: *RAI B.1.10-4*

Background
During the audit, the staff reviewed CNS calculations which justified continued operation of the suppression chamber with current pitting corrosion, until Refueling Outage 25 (July 2009).

Issue
Calculation NEDC 94-214 concludes that the suppression chamber pitting identified in 2005 is acceptable until July 2009, assuming a corrosion rate of .0026"/yr.

Request
Explain how the corrosion rate of .0026"/yr was determined. Also, explain how the pitting will be handled during the period of extended operation when the current calculation says that the existing condition of the torus is acceptable until July 2009.

NPPD Response:

The corrosion rate of 0.0026" per year was determined based on the maximum pit growth observed over a period of approximately 13 years. As indicated in calculation NEDC 94-214, Rev 4, Section 5 (page 5 of 6), the change in pit depth (for the pits in Bay 9) was determined by comparing observations from the 2005 inspection to those from the inspection approximately 13 years prior. The maximum calculated change in pit depth is 34 mils (for Pit No. 36). This corresponds to an approximate corrosion rate of 2.6 mils/yr or 0.0026"/yr.

Calculation NEDC 94-214 is updated following new measurements of the pits taken during torus inspections. The calculation provides evaluation of the identified pits and justification for continued operation of the torus. Accordingly, the calculation was updated in September 20, 2005 to evaluate the pits identified during the 2005 torus inspection. The calculation is not yet revised to include the most recent data. Specifically, during 2008, CNS used divers to gather data characterizing the pitting in the torus. Subsequently, NPPD's evaluation of the data concluded that the torus wall thickness is acceptable at least until 2014. Calculation NEDC 94-214 is being revised to reflect this evaluation. The torus will continue to be inspected to identify and evaluate pitting during the period of extended operation. The calculation will continue to be revised to reflect the results of inspections as they occur.

Attachment 2

Changes to the License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

This attachment provides changes to the License Renewal Application based on the responses to the RAIs provided in Attachment 1, as well as for other clarifications. The changes are presented in underline/strikeout format.[4]

1. Table 2.3.4-2-5 (Extraction Steam System) is revised to add the following line items:

Component Type	**Intended Function(s)**
Rupture disk	Pressure boundary
Trap	Pressure boundary

Reference: Response to RAI 2.1-1.

2. Table 2.3.4-2-9 (Main Steam System) is revised to add the following line item:

Component Type	**Intended Function(s)**
Trap	Pressure boundary

Reference: Response to RAI 2.1-1.

3. Table 2.3.4-2-10 (Reactor Feedwater System) is revised to add the following line items:

Component Type	**Intended Function(s)**
Flow element	Pressure boundary
Pump casing	Pressure boundary
Restriction orifice	Pressure boundary
Strainer housing	Pressure boundary
Trap	Pressure boundary
Turbine casing	Pressure boundary

Reference: Response to RAI 2.1-1.

[4] The changes shown are made against the original LRA submitted on September 24, 2008. Where other previously made LRA changes affect the same text, a footnote is provided cross-referencing the letter where the previous change was made.

4. The statement in the Discussion column of Table 3.2.1, Item 3.2.1-32 is revised as follows:

"The loss of material from the internal surfaces of steel components exposed to air – indoor is managed by the External Surfaces Monitoring~~, Fire Protection~~ and Periodic Surveillance and Preventive Maintenance Programs. The External Surfaces Monitoring Program manages loss of material for external carbon steel components by visual inspection of external surfaces. For systems where internal carbon steel surfaces are exposed to the same environment as external surfaces, external surface conditions will be representative of internal surfaces. Thus, loss of material on internal carbon steel surfaces is also managed by the External Surfaces Monitoring Program. The ~~Fire Protection and~~ Periodic Surveillance and Preventive Maintenance Programs manage<u>s</u> loss of material of carbon steel components by periodic visual inspection of component internal surfaces."

Reference: Response to RAI 3.2.2.1-3.

5. The statement in the Discussion column of Table 3.2.1, Item 3.2.1-34 is revised as follows:

"The Periodic Surveillance and Preventive Maintenance Program will manage loss of material for steel components exposed to internal condensation. The Periodic Surveillance and Preventive Maintenance Program will periodically ~~visually~~ inspect a representative sample of component internal surfaces<u> using visual inspections or other NDE techniques</u>."

Reference: Response to RAI 3.4.2.1-2.

6. The following Table 3.2.2-1 (Residual Heat Removal System) line items on pages 3.2-42, 3.2-44, and 3.2-45 are deleted and two Trap entries are made on page 3.2-44:

~~Piping~~	~~Pressure boundary~~	~~Carbon steel~~	~~Air – indoor (int)~~	~~Loss of material~~	~~External surfaces monitoring~~	~~V.D2-16 (E-29)~~	~~3.2.1-32~~	~~E~~
~~Trap~~	~~Pressure boundary~~	~~Carbon steel~~	~~Air – indoor (int)~~	~~Loss of material~~	~~External surfaces monitoring~~	~~V.D2-16 (E-29)~~	~~3.2.1-32~~	~~E~~
<u>Trap</u>	<u>Pressure boundary</u>	<u>Carbon steel</u>	<u>Treated water (int)</u>	<u>Cracking – fatigue</u>	<u>TLAA – metal fatigue</u>	<u>V.D2-32 (E-10)</u>	<u>3.2.1-1</u>	<u>A</u>

Trap	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR	V.D2-33 (E-08)	3.2.1-14	A, 201
~~Valve body~~	~~Pressure boundary~~	~~Carbon steel~~	~~Air – indoor (int)~~	~~Loss of material~~	~~External surfaces monitoring~~	~~V.D2-16 (E-29)~~	~~3.2.1-32~~	~~E~~

Reference: Response to RAI 3.2.2.1-2.

7. The following Table 3.2.2-3 (Automatic Depressurization System) line items on pages 3.2-50 and 3.2-52 are revised to read:

Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Reference: Response to RAI 3.2.2.1-2.

8. The following Table 3.2.2-4 (High Pressure Coolant Injection System) line items on pages 3.2-57 and 3.2-63 are revised to read:

Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Reference: Response to RAI 3.2.2.1-2.

9. The following Table 3.2.2-6 (Standby Gas Treatment System) line item on page 3.2-80 is revised to read:

Piping	Pressure boundary	Carbon steel	~~Air – outdoor (int)~~ Condensation (int)	Loss of material	~~External Surfaces Monitoring~~ Periodic Surveillance and Preventive Maintenance	~~VIII.B1-6 (SP-59)~~ V.D2-17 (E-27)	~~3.4.1-30~~ 3.2.1-34	E

Reference: Response to RAI 3.4.2.1-2.

10. The following Table 3.2.2-7 (Primary Containment System) line items on pages 3.2-85 and 3.2-88 are revised to read:

Flow indicator	Pressure boundary	Glass	~~Gas (int)~~ Air – indoor (int)	None	None	~~—~~ VII.J-7 (AP-48)	~~—~~ 3.3.1-93	~~G~~ C
Flow indicator	Pressure boundary	Stainless steel	~~Gas (int)~~ Air – indoor (int)	None	None	~~VF-15 (EP-22)~~ --	~~3.2.1-56~~ --	~~A~~ G

Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Reference: Response to RAIs 3.2-1 and 3.2.2.1-2.

11. The following Table 3.2.2-8-6 (Primary Containment System [10 CFR 54.4(a)(2)] line item on page 3.2-107 is revised to read:

Damper housing	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.B-1 (E-25)	3.2.1-32	E

Reference: Response to RAI 3.2.2.1-2.

12. The following Section 3.3.2.1.6 (Fire Protection – Water System) Aging Effects Requiring Management paragraph is revised to read:

- cracking – fatigue
- loss of material
- loss of preload
- change in material properties

Reference: Response to RAI 3.3.2-4.

13. The following Section 3.3.2.1.7 (Halon and CO_2) Aging Management Programs paragraph is revised to read:

"The following aging management programs manage the aging effects for the halon and CO_2 system components.

- Bolting Integrity
- Fire Protection
- Periodic Surveillance and Preventive Maintenance"

Reference: Response to RAI 3.2.2.1-3.

14. The following Section 3.3.2.1.12 (Plant Drains) Environment text is revised to read:

"Plant drains components are exposed to the following environments.

- air – indoor
- air – outdoor
- condensation
- raw water
- soil"

Reference: Response to RAI 3.2.2.1-2.

15. The following Section 3.3.2.1.14 (Miscellaneous Auxiliary Systems in Scope for 10 CFR 54.4(a)(2)), Aging Effects Requiring Management text is revised to read:

"The following aging effects associated with nonsafety-related components affecting safety-related systems requiring management.

- change in material properties
- cracking
- cracking - fatigue
- loss of material
- loss of preload"

Reference: Response to RAI 3.3.2-4

16. The following Table 3.3.2-4 (Diesel Generator System) line items on pages 3.3-81, 3.3-82, 3.3-83, 3.3-87, 3.3-90, 3.3-92, and 3.3-93 are revised to read:

Accumulator	Pressure boundary	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	~~V.D2-16 (E-29)~~ VII.H2-21 (A-23)	~~3.2.1-32~~ 3.3.1-71	E
Filter housing	Pressure boundary	Carbon steel	Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	VII.H2-21(A-23)	3.3.1-71	E
Filter housing	Pressure boundary	Carbon steel	Condensation (int)	Loss of material	Periodic surveillance and preventive maintenance	VII.H2-21(A-23)	3.3.1-71	E
Heat exchanger (housing)	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Piping	Pressure boundary	Carbon steel	Condensation (int)	Loss of material	Periodic surveillance and preventive maintenance	VII.H2-21(A-23)	3.3.1-71	E

Piping	Pressure boundary	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Cracking –fatigue	TLAA – metal fatigue	~~VII.E3-17 (A-34)~~ --	~~3.3.1-2~~ --	~~C~~ G
Strainer	Filtration	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	~~V.D2-16 (E-29)~~ VII.H2-21 (A-23)	~~3.2.1-32~~ 3.3.1-71	E
Strainer housing	Pressure boundary	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	~~V.D2-16 (E-29)~~ VII.H2-21 (A-23)	~~3.2.1-32~~ 3.3.1-71	E
Turbocharger	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Valve body	Pressure boundary	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	~~V.D2-16 (E-29)~~ VII.H2-21 (A-23)	~~3.2.1-32~~ 3.3.1-71	E

Reference: Response to RAI 3.2.2.1-2.

17. The following Table 3.3.2-5 (Fuel Oil Systems) line item on page 3.3-98 is revised to read:

~~Flame arrestor~~	~~Flow control~~	~~Gray cast iron~~	~~Air – outdoor (ext)~~	~~Loss of material~~	~~External surfaces monitoring~~	~~VII.H1-8 (A-24)~~	~~3.3.1-60~~	~~A~~
Flame arrestor	Flow control	~~Gray cast iron~~ Copper alloy	Air – outdoor (int)	Loss of material	~~External Surfaces Monitoring~~ Periodic Surveillance and Preventive Maintenance	~~VIII.B1-6 (SP-59)~~ --	~~3.4.1-30~~ --	~~E~~ G
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Reference: Response to RAIs 3.2.2.1-2 and 3.4.2.1-2.

18. The following Table 3.3.2-6 (Fire Protection – Water System) line items on pages 3.3-103, 3.3-104, 3.3-106, 3.3-111, and 3.3-113 are revised to read:

Duct	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.B-1 (E-25)	3.2.1-32	C
Nozzle	Pressure boundary & flow control	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Tubing	Pressure boundary	Plastic	Air – indoor (ext)	~~None~~ Change in material properties	~~None~~ Periodic surveillance and preventive maintenance	--	--	F
Valve body	Pressure boundary	Plastic	Air – indoor (ext)	~~None~~ Change in material properties	~~None~~ Periodic surveillance and preventive maintenance	--	--	F

Reference: Responses to RAIs 3.2.2.1-2 and 3.3.2-4.

19. The following Table 3.3.2-7 (Halon and CO_2 Systems) line items on pages 3.3-116, 3.3-117, and 3.3-118 are revised to read:

Nozzle	Pressure boundary & flow control	Carbon steel	Air – indoor (int)	Loss of material	~~Fire protection~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~Fire protection~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E
Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~Fire protection~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Reference: Response to RAI 3.2.2.1-3.

20. The following Table 3.3.2-12 (Plant Drains) line items on pages 3.3-141 and 3.3-144 are revised to read:

Piping	Pressure boundary	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	~~V.D2-16 (E-29)~~ VII.H2-21 (A-23)	~~3.2.1-32~~ 3.3.1-71	E

Valve body	Pressure boundary	Carbon steel	~~Air – indoor (int)~~ Condensation (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	~~V.D2-16 (E-29)~~ VII.H2-21 (A-23)	~~3.2.1-32~~ 3.3.1-71	E

Reference: Response to RAI 3.2.2.1-2.

21. The following Table 3.3.2-13 (Nitrogen System) line items on pages 3.3-148 and 3.3-151 are deleted:

~~Piping~~	~~Pressure boundary~~	~~Carbon steel~~	~~Air – indoor (int)~~	~~Loss of material~~	~~External surfaces monitoring~~	~~V.D2-16 (E-29)~~	~~3.2.1-32~~	~~E~~
~~Valve body~~	~~Pressure boundary~~	~~Carbon steel~~	~~Air – indoor (int)~~	~~Loss of material~~	~~External surfaces monitoring~~	~~V.D2-16 (E-29)~~	~~3.2.1-32~~	~~E~~

Reference: Response to RAI 3.2.2.1-2.

22. The following Table 3.3.2-14-2 (Auxiliary Steam System [10 CFR 54.4(a)(2)]) line items on pages 3.3-159, 3.3-160, 3.3-161, 3.3-162, 3.3-164, and 3.3-165 are revised as follows:

Piping	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305
Strainer housing	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305
Strainer housing	Pressure boundary	Gray cast iron	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305
Trap	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305
Trap	Pressure boundary	Gray cast iron	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305
Valve body	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305

Valve body	Pressure boundary	Gray cast iron	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305

Reference: Response to RAI 3.1-3.

23. The following Table 3.3.2-14-11 (Heating and Ventilating System [10 CFR 54.4(a)(2)] line items on pages 3.3-196 and 3.3-197 are revised to read:

Strainer housing	Pressure boundary	Gray cast iron	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305
Trap	Pressure boundary	Gray cast iron	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	~~VIII.B1-10~~ VIII.B2-5 (S-08)	3.4.1-1	C, 305

Reference: Response to RAI 3.1-3.

24. The following Table 3.3.2-14-18 (Reactor Equipment Cooling System [10 CFR 54.4(a)(2)]) line item on page 3.3-221 is revised to read:

Pump casing	Pressure boundary	Plastic	Air – indoor (ext)	~~None~~ Change in material properties	~~None~~ Periodic surveillance and preventive maintenance	--	--	F

Reference: Response to RAI 3.3.2-4.

25. The following Table 3.3.2-14-20 (Radiation Monitoring – Ventilation System [10 CFR 54.4(a)(2)]) line items on pages 3.3-228 and 3.3-229 are revised to read:

Piping	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Valve body	Pressure boundary	Carbon steel	Air – indoor (int)	Loss of material	~~External surfaces monitoring~~ Periodic surveillance and preventive maintenance	V.D2-16 (E-29)	3.2.1-32	E

Reference: Response to RAI 3.2.2.1-2.

26. The following Table 3.3.2-14-29 (Turbine Equipment Cooling System [10 CFR 54.4(a)(2)]) line item on page 3.3-262 is revised to read:

Pump casing	Pressure boundary	Plastic	Air – indoor (ext)	~~None~~ Change in material properties	~~None~~ Periodic surveillance and preventive maintenance	--	--	F

Reference: Response to RAI 3.3.2-4.

27. The statement in the Discussion column of Table 3.4.1, Item 3.4.1-30 is revised as follows:

"~~The loss of material from the internal surfaces of steel components exposed to air – outdoor is managed by the Periodic Surveillance and Preventive Maintenance Program using periodic visual inspections. External Surfaces Monitoring Program. The External Surfaces Monitoring Program manages loss of material for external carbon steel components by visual inspection of external surfaces. For systems where internal carbon steel surfaces are exposed to the same environment as external surfaces, external surface conditions will be representative of internal surfaces. Thus, loss of material on internal carbon steel surfaces is also managed by the External Surfaces Monitoring Program. The components to which this NUREG-1801 line item applies are in the ESF and auxiliary systems in Tables 3.2.2-x and 3.3.2-x.~~ This item was not used. There are no steel components internally exposed to outdoor air or condensation in the steam and power conversion systems."

Reference: Response to RAI 3.4.2.1-2.

28. The following Table 3.4.2-2-5 (Extraction Steam System) line items are inserted on page 3.4-58:

Rupture disk	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Rupture disk	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR	VIII.A-13 (SP-46)	3.4.1-37	C
Rupture disk	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR	VIII.A-11 (SP-45)	3.4.1-13	C, 402
Rupture disk	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	--	--	H
Rupture disk	Pressure boundary	Stainless steel	Treated water >140°F (int)	Loss of material	Water chemistry control – BWR	VIII.C-1 (SP-16)	3.4.1-16	A, 402
Rupture disk	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking	Water chemistry control – BWR	VIII.E-31 (SP-19)	3.4.1-14	C, 402
Rupture disk	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking – fatigue	TLAA – metal fatigue	VII.E3-14 (A-62)	3.3.1-2	C
Trap	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Trap	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR	VIII.C-3 (S-04)	3.4.1-2	A, 402
Trap	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	VIII.B2-5 (S-08)	3.4.1-1	C
Trap	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR	VIII.C-6 (S-09)	3.4.1-4	A, 402
Trap	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	VIII.B2-5 (S-08)	3.4.1-1	C

Reference: Response to RAI 2.1-1.

29. The following Table 3.4.2-2-9 (Main Steam System) line items are inserted on pages 3.4-77 and 3.4-79:

Trap	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Trap	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR	VIII.B2-3 (S-05)	3.4.1-37	A
Trap	Pressure boundary	Carbon steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	VIII.B2-5 (S-08)	3.4.1-1	A
Trap	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR	VIII.B2-6 (S-09)	3.4.1-4	A, 402
Trap	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	VIII.B2-5 (S-08)	3.4.1-1	A
Valve body	Pressure boundary	Copper alloy > 15% Zn or > 8% Al	Steam (int)	Loss of material	Selective Leaching	--	--	G

Reference: Response to RAIs 2.1-1 and 3.4-1.

30. The following Table 3.4.2-2-10 (Reactor Feedwater System) line items are inserted on pages 3.4-81, 3.4-82, and 3.4-83:

Flow element	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR	VIII.D2-7 (S-09)	3.4.1-4	A, 402
Flow element	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	VIII.B2-5 (S-08)	3.4.1-1	C
Pump casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Pump casing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR	VIII.D2-7 (S-09)	3.4.1-4	A, 402

Restriction orifice	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Restriction orifice	Pressure boundary	Stainless steel	Treated water >140°F (int)	Loss of material	Water chemistry control – BWR	VIII.D2-4 (SP-16)	3.4.1-16	A, 402
Restriction orifice	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking	Water chemistry control – BWR	VIII.E-31 (SP-19)	3.4.1-14	C, 402
Restriction orifice	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking – fatigue	TLAA – metal fatigue	VII.E3-14 (A-62)	3.3.1-2	C
Strainer housing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Strainer housing	Pressure boundary	Stainless steel	Treated water >140°F (int)	Loss of material	Water chemistry control – BWR	VIII.D2-4 (SP-16)	3.4.1-16	A, 402
Strainer housing	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking	Water chemistry control – BWR	VIII.E-31 (SP-19)	3.4.1-14	C, 402
Strainer housing	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking – fatigue	TLAA – metal fatigue	VII.E3-14 (A-62)	3.3.1-2	C
Strainer housing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Loss of material	Water chemistry control – BWR	VIII.D2-7 (S-09)	3.4.1-4	A, 402
Strainer housing	Pressure boundary	Carbon steel	Treated water (int)	Cracking – fatigue	TLAA – metal fatigue	VIII.B2-5 (S-08)	3.4.1-1	C
Trap	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	VIII.I-10 (SP-12)	3.4.1-41	A
Trap	Pressure boundary	Stainless steel	Steam (int)	Loss of material	Water chemistry control – BWR	VIII.B2-2 (SP-46)	3.4.1-37	C
Trap	Pressure boundary	Stainless steel	Steam (int)	Cracking	Water chemistry control – BWR	VIII.B2-1 (SP-45)	3.4.1-13	C, 402
Trap	Pressure boundary	Stainless steel	Steam (int)	Cracking – fatigue	TLAA – metal fatigue	--	--	H

Trap	Pressure boundary	Stainless steel	Treated water >140°F (int)	Loss of material	Water chemistry control – BWR	VIII.D2-4 (SP-16)	3.4.1-16	A, 402
Trap	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking	Water chemistry control – BWR	VIII.E-31 (SP-19)	3.4.1-14	C, 402
Trap	Pressure boundary	Stainless steel	Treated water >140°F (int)	Cracking – fatigue	TLAA – metal fatigue	VII.E3-14 (A-62)	3.3.1-2	C
Turbine casing	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External surfaces monitoring	VIII.H-7 (S-29)	3.4.1-28	A
Turbine casing	Pressure boundary	Carbon steel	Steam (int)	Loss of material	Water chemistry control – BWR	VIII.A-15 (S-04)	3.4.1-2	C, 402

Reference: Response to RAI 2.1-1.

31. Table 4.2-3 on Page 4.2-8 is revised to read:

"54 EFPY 1/4 T Fluence (n/cm^2)   1.07E+18~~7~~"

Reference: Response to RAI 4.2-3.

32. Section A.1.1.13 (Environmental Qualification (EQ) of Electric Components Program) is revised to read:

"The Environmental Qualification (EQ) of Electric Components Program is an existing program that manages the effects of thermal, radiation, and cyclic aging through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components are refurbished, replaced, or their qualification is extended prior to reaching the aging limits established in the evaluation. Reanalysis of an aging evaluation addresses attributes of analytical methods; data collection and reduction methods; underlying assumptions; and acceptance criteria and corrective actions. Some aging evaluations for EQ components are time-limited aging analyses (TLAAs) for license renewal."

Reference: Response to RAI B.1.13-3.

33. The following Section A.1.1.22 (Metal-Enclosed Bus Inspection Program) text in the third paragraph is revised to read:

"This program will be implemented prior to the period of extended operation. This new program will be implemented consistent with the corresponding program described in NUREG-1801, Section XI.E4, Metal-Enclosed Bus, prior to the period of extended operation. In addition to activities described in NUREG-1801, Section XI.E4, the program includes inspection of the bus enclosure assemblies. Inspection of the bus enclosure assemblies will be completed prior to the period of extended operation, and at least once every 10 years thereafter."

Reference: Response to RAI B.1.22-3.

34. The following Section A.1.1.31 bullets on page A-19 are revised to read:

- HPCI system piping and components related to suppression chamber level instrumentation
- ADS piping and valve body components exposed to indoor air
- DG system air intake components
- DGDO fuel oil tank vent piping and flame arrestors
- FP halon/CO_2 piping and components
- FP nozzles and piping in dry pipe suppression subsystem and air intake duct on the diesel engine-driven fire pump
- FP system plastic tubing and valve body components
- piping, piping components, and piping elements in the circulating water system, nonradioactive floor drain system, heating and ventilation system, off gas system, potable water system, primary containment system, radiation monitoring – ventilation system, radwaste system, diesel generator starting air system, reactor equipment cooling system, turbine equipment cooling system, and service air system
- service air primary containment penetration X-21
- nitrogen system vaporizer tank and vaporizer coil

Reference: Responses to RAIs 3.2.2.1-2, 3.2.2.1-3, 3.3.2-4, 3.4.2.1-2.

35. The following revisions and additions are made to the Section B.1.31 (Periodic Surveillance and Preventive Maintenance) program activities table entries on pages B-91, B-92, and B-93:

High pressure core injection (HPCI) system	Perform visual or other non-destructive examination of the external surfaces of the copper alloy turbine lube oil heat exchanger tubes to manage wear. Perform internal visual or other non-destructive examination of a representative sample of carbon steel piping and component internals containing indoor air.
Automatic depressurization system (ADS)	Perform visual or other non-destructive examination of carbon steel ADS components in waterline region of the suppression chamber to manage loss of material of main steam relief tailpipes and T-quenchers Perform internal visual or other non-destructive examination of a representative sample of carbon steel piping and component internals containing indoor air.
Standby gas treatment (SGT) system	Perform visual inspection of a representative sample of SGT system carbon steel components exposed to raw water (drain water) to manage loss of material. Perform visual inspection of a representative sample of SGT system copper alloy components exposed to raw water (drain water) to manage loss of material. Perform internal and external visual inspection and manually flex the fan inlet flexible connections to verify the absence of cracks and significant change in material properties. Perform visual inspection or other non-destructive examination of the plant stack internal surface.

Plant drains system	Perform internal visual inspection of a representative sample of carbon steel, stainless steel, copper alloy, and gray cast iron plant drain components exposed to raw water (drain water) to manage loss of material. Perform visual inspection of the inside and outside surfaces of a representative sample of gray cast iron and aluminum pump casings exposed to raw water (drain water) to manage loss of material. Perform visual inspection of the outside surface of gasoline-powered gray cast iron pump casings exposed to air indoor to manage loss of material. Perform internal visual inspection of a representative sample of carbon steel plant drain components related to Z-sump instrumentation exposed to indoor air to manage loss of material.
Diesel generator (DG) system[5]	Perform internal visual inspection of a representative sample of DG exhaust gas components to manage loss of material. Perform intercooler operability testing to manage fouling for stainless steel tubes and aluminum fins. Perform visual inspection of a representative sample of DG service air component internal surfaces to manage loss of material. Perform internal visual inspection or other non-destructive examination of a representative sample of DG air intake components exposed to indoor air. Perform internal visual inspection or other non-destructive examination of a representative sample of DG starting air piping and components exposed to condensation.
Diesel generator fuel oil (DGDO)	Perform internal visual inspection or other non-destructive examination of diesel fuel oil storage tank vent piping and flame arrestors.

[5] The DG system program activity on Page B-91 was previously changed in NLS2009049 (ADAMS Accession Number ML091800024) in response to RAI 3.3.2.2.3.3-1.

Fire protection halon and CO_2 systems (FP/CO_2)	Perform internal visual or other non-destructive examination of a representative sample of carbon steel piping and component internals containing indoor air in the halon and CO_2 systems.
Fire protection – water (FP)	Perform internal visual inspection or other non-destructive examination of nozzles and piping in the dry pipe water suppression sub-system and air intake duct on the diesel engine-driven fire pump. Perform external visual inspection of plastic tubing and valve body components.
Primary containment (PC) system	Visually inspect the internal surface of a representative sample of carbon steel equipment and floor drain components exposed to raw water (drain water) to manage loss of material. Perform internal visual or other non-destructive examination of a representative sample of carbon steel piping and component internals containing indoor air.
Nonsafety-related systems affecting safety-related systems	Visually inspect the internal surfaces of a representative sample of carbon steel, copper alloy, and gray cast iron piping, piping elements, and components in the circulating water system exposed to raw water (river water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel, copper alloy and gray cast iron piping, piping elements, and components in the nonradioactive floor drain system exposed to raw water (drain water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel piping, piping elements, and components in the heating and ventilation (HV) system exposed to raw water (drain water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel piping, piping elements, and components in the off gas (OG) system exposed to raw water (drain water) to manage loss of material.

(continued)	Visually inspect the internal surfaces of a representative sample of copper alloy piping, piping elements, and components in the potable water (PW) system exposed to treated water (potable water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel and copper alloy piping, piping elements, and components in the radwaste (RW) system exposed to raw water (liquid radwaste) to manage loss of material. Visually inspect the internal surfaces of a representative sample of piping, piping elements, and components in the diesel generator starting air (DGSA) and service air (SA) systems exposed to condensation to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel piping, piping elements, and components in the primary containment (PC) system exposed to indoor air to manage loss of material. Perform internal visual or other non-destructive examination of a representative sample of carbon steel piping and component internals in the radiation monitoring – ventilation system (RMV) containing indoor air. Perform external visual inspection of reactor equipment cooling (REC) and turbine equipment cooling (TEC) plastic pump casing components.

Reference: Responses to RAIs 3.2.2.1-2, 3.2.2.1-3, 3.3.2-4, and 3.4.2.1-2.

36. Delete the third paragraph of Section B.1.37 (Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)) "Program Description":

"For pump casings and valve bodies, based on the assessment documented in the letter dated May 19, 2000, from Christopher Grimes, NRC, to Douglas Walters, Nuclear Energy Institute (NEI), screening for susceptibility to thermal aging is not required. The existing ASME Section XI inspection requirements, including the alternative requirements of ASME Code Case N-481 for pump casings, are adequate for all pump casings and valve bodies."

Reference: CNS does not have any CASS pump casings or valve bodies internal to the reactor vessel. Therefore, this paragraph is not necessary.

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS2009055

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		