COOPER NUCLEAR STATION LICENSE RENEWAL
REQUEST FOR ADDITIONAL INFORMATION

RAI 2.3.3-1

Background
License renewal rule Title 10 of the *Code of Federal Regulations* (10 CFR) Section 54.21(a)(1) requires applicants to identify and list all components subject to an aging management review (AMR). The staff confirms inclusion of all components subject to AMR by reviewing the components within the license renewal boundary.

Issue
During the scoping and screening review process, the continuation from one drawing to another could not be established. Drawing numbers and/or locations for continuations were not identified, could not be located where identified, or the continuation drawing was not provided.

License Renewal Application (LRA) Section/Drawing Number	Continuation Location / Issue
2.3.3.3	
SERVICE WATER	
LRA-2006-SH01	G/H/J-12: The continuations for four lines in scope for (a)(2) are not identified.
LRA-2006-SH04	J-8: Continuation from drain valve 121 refers to Note 2. Valve 121 is not included in Note 2.
2.3.3.14	
REACTOR WATER CLEANUP (RWCU)	
LRA-2027-SH01	A-1: two lines continued "TO DRAIN" with no continuation drawing identified.
	B-1 (2 places): lines "TO DRAIN HEADER" with no continuation drawing identified.
	C-1 and B-2: lines "TO HOODED SINK" with no continuation drawing identified
TURBINE EQUIPMENT COOLING	
LRA-2007-0	A-3: Line downstream of valve 612 shown as in scope for (a)(2) continuing to drawing 2091 SH 3. Drawing 2091 SH 3 was not provided.
	A-5 (2 places), B-5 and B-6: Lines identified as in scope for (a)(2) are identified as continuing to "TO WASTE" without having the continuation location identified,
DEMINERALIZED WATER	
LRA-2005 SH 2	B-3: shows a line downstream of valve DW-339 as

ENCLOSURE

	in scope for (a)(2) and subject to an AMR. No continuation was provided.
LRA-2013	F-7: continuation says line downstream of valve 588 and 590 "TO TCC SYS CHEM TANK." Confirm this should be "TO SURGE TANK."
2.3.4.1	
MSIV LEAKAGE PATHWAY	
LRA-2004-SH01	D-1: ½" stainless steel piping (1/2" CH-4) piping continuing on "To SR-1C RX BLDG".
2.3.4.2	
CONDENSATE MAKEUP	
LRA-2042-SH03	D-10: Shows 2" line continued to LRA-2038 Zone D-10. Unable to find the continuation on LRA-2038.
LRA-2049-SH03	C/D-2: Lines downstream of valves (187) and (188) are shown as in scope for (a)(2) with no continuation location identified.
	D-3: Line 1-CM-189-1" identified as continuing "TO EQUIP DR" with no continuation location identified.

Request
Provide sufficient information for the continuation of boundary identification issues identified above to permit the staff to review all portions of the system within the license renewal boundary.

RAI 3.1.2.3-1

Background
License Renewal Application (LRA) Table 3.1.2-3 contains items addressing carbon steel valve bodies less than 4 inches nominal pipe size exposed to indoor air on their external surfaces. The applicant proposes that this combination of component and material is not found in the GALL Report (general note G). The applicant further proposes that this combination of environment and material is not subject to aging and that no aging management program is required.

Issue
In its review, the staff found that essentially identical combinations of materials and environments were present in the GALL Report, albeit not in the reactor coolant system. The staff noted that the applicant's basis for stating that no aging effect was present was that the temperature of the components under consideration was above the dewpoint. The GALL Report finds that the aging effect of loss of material due to exposure of steel surfaces to indoor air, which can result in condensation but only rarely, should be considered. The staff also noted some apparent contradiction between plant-specific notes 102 and 104 which are related to these components.

Request
Please clarify the plant-specific notes and to justify why aging management is not required for these components given that, during normal plant events such as refueling, the components under consideration will be at or near ambient temperature.

RAI 3.2.2.1-4

Background
LRA and SRP Tables 3.2.1-34 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 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 3.2.1-34 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 3.2.1-34, the staff noted that the aging effect being considered is loss of material from the internal surfaces of piping in the reactor core isolation cooling (RCIC) system. The staff also noted that in the table included in the proposed aging management program (AMP), the applicant routinely states whether the inspections to be performed are internal or external. However, for piping inspection in the RCIC system, the applicant is silent concerning whether the inspections to be conducted are internal, external, or both.

Request
Please specify in the proposed AMP whether the inspections to be conducted of piping in the RCIC system are internal, external or both.

RAI 3.2.2.1-5

Background
LRA and SRP Tables 3.3.1-47 address the loss of material due to general, pitting, and crevice corrosion from the steel piping, piping components, piping elements, tanks and heat exchanger components. The SRP defines the environment as "closed cycle cooling water". The LRA defines the environment as "treated water". The applicant proposes that "treated water" approximates "closed cycle cooling water" (LRA note 306). The applicant proposes to manage this aging process through the use of its aging management program "Water Chemistry Control – Auxiliary Systems" (LRA B.1.38). The GALL Report recommends that this aging process be managed through the use of the aging management program "Closed Cycle Cooling Water System" (GALL Report Volume 2 Chapter XI.M21). 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 3.3.1-47 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 3.3.1-47, the staff noted that neither the target values for the water chemistry nor the industry standard upon which the target water chemistry values are based are provided. The staff also noted from the operating experience associated with the proposed aging management program that water chemistry excursions are not rare events. The staff further noted that the proposed aging management program calls for a one time inspection to verify the effectiveness of the water chemistry program. Lastly, the staff questions the effectiveness of a one time inspection program for the components being considered in light of the water chemistry excursions reported in the applicant's operating experience and the inclusion of periodic inspections in the aging management program recommended by the GALL Report.

Request
Please provide information concerning the target water chemistry values, the source of the industry guidelines used in determining the appropriate water chemistry for the system (it should be noted that water chemistry guidance provided by a manufacturer or a water treatment company do not constitute an industry standard), the critical characteristics of the system(s) being considered, e.g., boiler pressures, and justification regarding why a one time inspection should be considered adequate to manage aging in light of the stated variability in the water chemistry.

RAI 3.2.2.1-8

Background
LRA and Standard Review Plan (SRP) Tables 3.2.1-35 address the loss of material due to general, pitting, crevice, galvanic, and microbiologic corrosion as well as fouling of steel containment isolation piping and components exposed to raw water. 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 effect 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 3.2.1-35 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 consideration of these aging management review items, the staff notes that inspection of the internal surfaces of all containment isolation piping is not specifically mentioned in the proposed program. The staff also noted that the aging management program recommended by the GALL Report addresses inspection, performance testing, and materials of construction of containment isolation piping while the program proposed by the applicant is only an inspection program which may or may not inspect the internal surfaces of the subject piping. The staff questions how the proposed aging management program will address internal corrosion using external inspections.

Request
Please clarify how the proposed program will manage corrosion on the internal surfaces of containment isolation piping.

RAI 3.2.2.2-1

Background
LRA and SRP Sections 3.2.2.2.3.6 refer to LRA and SRP Tables 3.2.1-8. These tables address the loss of material due to pitting and crevice corrosion on stainless steel, piping, piping components, and piping elements as well as tanks exposed to internal condensation. These tables recommend "further evaluation" on the part of the staff. 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 a plant-specific aging management program. The applicant proposes that the aging management review items associated with Table 3.2.1-8 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 3.2.1-8, the staff noted that the aging effect being considered is loss of material from the internal surfaces of piping in the RCIC system. The staff also noted that in the table included in the proposed AMP, the applicant routinely states whether the inspections to be performed are internal or external. However, for piping inspection in the RCIC system, the applicant is silent concerning whether the inspections to be conducted are internal, external, or both.

Request
Please specify in the proposed AMP whether the inspections to be conducted of piping in the RCIC system are internal, external or both.

RAI 3.3-3

Background
In LRA Table 3.3.2-4, tubing and valve bodies fabricated from stainless steel exposed to condensation (internal) credit the Periodic Surveillance and Preventive Maintenance program. In LRA Table 3.3.2-14-25, tubing and valve bodies fabricated from stainless steel exposed to condensation (internal) credit the One-Inspection program. In both instances the AMR line items refer to GALL AMR Item# VII.D-4 and LRA Table 3.3.1 Item# 3.3.1-54. The GALL Report recommends GALL AMP XI.M24 "Compressed Air Monitoring" which includes (a) frequent leak testing of valves, piping, and other system components, especially those made of carbon steel and stainless steel; and (b) preventive monitoring that checks air quality at various locations in the system to ensure that oil, water, rust, dirt, and other contaminants are kept within the specified limits.

Issue
It is not clear to the staff how the inspections performed by the Periodic Surveillance and Preventive Maintenance program or the One-Time Inspection program will substitute the recommendations of GALL AMP XI.M24 "Compressed Air Monitoring".

Request
Please justify the use of the Periodic Surveillance and Preventive Maintenance program in the Diesel Generator System and the One-Time Inspection program in the Service Air System for aging management, which will only perform visual and/or NDE inspections, in lieu of GALL AMP XI.M24, which include leak testing and checks for air quality.

RAI 3.3.2.1-5

Background
LRA and SRP Tables 3.3.1-79 address the loss of material due to pitting, crevice corrosion and fouling 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 plan proposed by the GALL Report. As a result, the applicant proposes that the aging management review items associated with Table 3.3.1-79 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 3.3.1-79, the staff noted that the One Time Inspection Aging Management Program 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, including any untreated and substantially unmonitored water system, cannot be considered to be invariant with time in terms of chemistry or microbiology.

Request
Please propose a program to manage the aging of the components under consideration 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.

RAI 3.3.2.1-7

Background
LRA and SRP Tables 3.3.1-83 address the reduction of heat transfer due to fouling of stainless steel and copper alloy heat exchanger tubes exposed to raw water. 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, "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 3.2.1-83 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 3.3.1-83, the staff noted that the item under consideration is heating/cooling coil serving the nitrogen system. The staff also noted that the aging effect under consideration is loss of heat transfer due to fouling. Based on the information presented in the application, the staff must assume that the applicant correctly chose to apply Table 3.3.1-83 to this component. In the absence of additional information, the staff must also assume that generic letter 89-13 applies to the component under consideration.

Request
Please propose an aging management program equivalent to the open cycle cooling water AMP or justify why generic letter 89-13 does not apply to this system. This justification should include a complete description of the water system associated with the nitrogen system including the water source and its typical chemical composition.

RAI 3.3.2.2.6-2

Background
The GALL Report identifies aging effects for stainless steel spent fuel storage racks and neutron absorbing materials (e.g., Boraflex or boron-steel sheets) in boiling water reactor (BWR) treated water. Aging effects include loss of material/general corrosion and reduction of neutron-absorbing capacity, and further evaluation of a plant-specific aging management program for those neutron absorbing materials. The GALL Report, Revision 1, does not address the specific use of Metamic™, a boron carbide aluminum composite, as a neutron absorber material in spent fuel pools.

LRA Section 2.3.3.9, "Fuel Pool Cooling and Cleanup," identifies that the spent fuel pool cooling and cleanup system includes Metamic™, to provide criticality control.

In a license amendment that permitted the use of Metamic™ in the spent fuel pool at Cooper Nuclear Station (CNS), the applicant implemented a coupon surveillance program in its license amendment commitments to assess degradation of this material in its environment.

Issue
CNS LRA Section 3.3.2.2.6, "Reduction of Neutron-Absorbing Capacity and Loss of Material due to General Corrosion," addresses Boral spent fuel storage racks exposed to a treated water environment, but does not address Metamic™. LRA Table 3.3.2-9 states that management of loss of material for "aluminum/boron carbide panels 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 reduction of neutron-absorbing capacity or loss of material for Metamic™ in the spent fuel pool. Section B.1.23 of the LRA, entitled "Neutron Absorber Monitoring," specifically indicates that the scope of this program includes "all Boral in the CNS spent fuel pool," and does not include Metamic™ or aluminum/boron carbide.

Request
1. Regarding aging effects for Metamic™ used in the spent fuel pool:

    a. Identify the aging effects which apply to the Metamic™ (e.g., loss of material/general corrosion and reduction of neutron-absorbing capacity).

    b. If the aging effects requiring management (AERM) for Metamic™ do not include both of the aging effects cited in the GALL Report for neutron absorbing materials, provide the technical basis (including operating experience) that justifies the exclusion of the aging effect(s) cited in the GALL Report.

2. If the applicant identifies AERM for Metamic™, describe the aging management program(s) that will be used. Specifically:

a. If the applicant proposes the CNS Water Chemistry Control – BWR Program for aging management, describe how this program will be used to manage AEMR for Metamic™.

b. Provide the 10 elements of the aging management program for Metamic™ (i.e., scope of program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance, corrective actions, confirmation process, administrative controls, operating experience), including the coupons that will be under surveillance.

c. Indicate whether the Metamic™ panels and coupons in the CNS spent fuel pool are vented or not.

d. Indicate the installation date of the Metamic™ panels/racks in the CNS spent fuel pool.

e. Describe the surveillance approach that will be used in the cited AMP, specifically the methods, techniques (e.g., visual, weight, volumetric, surface inspection), frequency, sample size, data collection, timing, and acceptance criteria.

f. Discuss the correlation between measurements of the physical properties of Metamic™ coupons and the integrity of the Metamic™ panels in the storage racks.

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

h. For the CNS Metamic™ coupons:

    i. Identify the quantity and location of Metamic™ 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 Metamic™ 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?

i. Describe how the results from the inspections of the Metamic™ coupons will be monitored and trended, including frequency and sample size (e.g., the number of coupons examined at each surveillance).

j. Describe the corrective actions that would be implemented if coupon test results do not meet the acceptance criteria.

k. Discuss any relevant industry or plant-specific operating experience applicable to the Metamic™ panels and coupons.

RAI 3.3-7

Background
For the following descriptions please answer the questions that follow:

- In LRA Table 3.3.2-12, the Periodic Surveillance and Preventative Maintenance program was credited for managing loss of material for gray cast iron pump casings in an air-indoor (internal) environment and reference LRA Table 3.2.1 Item# 3.2.1-32 and GALL aging management review (AMR) Item# V.D2-16.

- In LRA Table 3.3.2-13, the External Surfaces Monitoring program was credited for managing loss of material for gray cast iron valve bodies in an air-indoor (internal) environment was credited for managing for loss of material and reference LRA Table 3.2.1 Item# 3.2.1-32 and GALL AMR Item# V.D2-16.

- In LRA Table 3.3.2-05, the External Surfaces Monitoring program was credited for managing loss of material for gray cast iron flame arrestors in an air-outdoor (internal) environment and reference LRA Table 3.4.1 Item# 3.4.1-30 and GALL AMR Item# VIII.B1-6.

The GALL Report recommends the program XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" for aging management each instance described above.

Issue
The program descriptions of the Periodic Surveillance and Preventative Maintenance program and External Surfaces Monitoring program state these programs are credited for managing loss of material for the internal surface for situations where the external and internal material and environment combinations are the same such that the external surface is representative of the internal surface condition. It is unclear to the staff if the conditions of the internal and external environment of these components are the same, because the internal environment may contain contaminants and stagnant air which is not the same as freely circulating air on the external surface.

Request
Please describe in detail the conditions that exist in the internal environment of the components described above and how it compares with the external environment. Also, please justify the credited AMPs ability to manage aging of the internal surface by visually inspecting the external surface, in lieu of as the program recommended by the GALL Report.

RAI 3.4.2.1-1

Background
Standard Review Plan for Review of License Renewal Application for Nuclear Power Plants (SRP-LR) and LRA Table 3.4.1-28 address the loss of material due to general corrosion from the external surfaces of steel components exposed to uncontrolled indoor air, outdoor air or condensation. Both the SRP-LR and LRA Table 3.4.1-28 propose the use of the Aging Management Program "External Surfaces Monitoring" (LRA B.1.14 and GALL Report Volume 2 Chapter XI.M36) to manage the aging process. However, for at least some LRA Table 2 items subordinate to LRA Table 3.4.1-28, the applicant proposes that no aging effect is present and that no aging management program is required (generic note I).

Issue
In its review of LRA Table 3.4.1-28, the staff noted that the applicant's basis for stating that no aging effect was present was that the temperature of the components under consideration was above the dewpoint. The GALL Report finds that the aging effect of loss of material due to exposure of steel surfaces to indoor air, which can result in condensation but only rarely, should be considered.

Request

Please justify why aging management is not required for these components given that, during normal plant events such as refueling, the components under consideration will be at or near ambient temperature.

RAI 3.4.2.1-4

Background

LRA and SRP Tables 3.4.1-32 address the loss of material due to pitting, crevice, and microbiologically influenced corrosion as well as fouling for stainless steel and copper alloy 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, "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, "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).

Issue
In its review of LRA Table 3.4.1-32, the staff noted that the item under consideration is tubing serving the circulating water system. The staff also noted that the aging effect under consideration is loss of material. The staff further noted that at many plants portions of the circulating water system are considered to be safety related due to their relationship with the service water system. Based on the information presented in the application, the staff must assume that the applicant correctly chose to apply Table 3.4.1-32 to this component. In the absence of additional information, the staff must also assume that generic letter 89-13 applies to the component under consideration.

Request
Please propose an aging management program equivalent to the open cycle cooling water AMP or justify why generic letter 89-13 does not apply to this system.

RAI 3.4.2.2-1

Background
LRA and SRP Sections 3.4.2.2.3 refer to LRA and SRP Tables 3.4.1-8. These tables address the loss of material due to general, pitting, crevice, and microbiologically influenced corrosion (MIC), as well as fouling in steel piping, piping components and piping elements exposed to raw water. These tables recommend "further evaluation" on the part of the staff. 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 a plant-specific aging management program. The applicant proposes that the aging management review items associated with Table 3.4.1-8 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 3.4.1-8, the staff noted that the components under consideration are part of the circulating water system. The staff also noted that the GALL Report recommends a plant-specific aging management program because at least most of the circulating water system is not within the scope of the GALL AMP, "open cycle cooling water". The staff further noted that the materials and environments currently under consideration are probably identical to the materials and environments for which the recommended AMP is open cycle cooling water. The staff concludes that an appropriate AMP for this service would include most of the key points included in the open cycle cooling water AMP. Lastly the staff noted that the proposed program is only a visual inspection program.

Request
Please propose an aging management program which is substantially consistent with the open cycle cooling water AMP or justifying how the proposed program will adequately manage internal corrosion of the components under consideration.

RAI 4.1-1

Boiling water reactor vessels internals project (BWRVIP)-25, "BWR Core Plate Inspection and Flaw Evaluation Guidelines."

The core plate hold-down bolts connecting the core plate to the core shroud are initially preloaded during installation. These bolts are subject to stress relaxation due to thermal and irradiation effects. Section 4.1 item (4) of staff's license renewal safety evaluation (SE) dated December 7, 2000, for the BWRVIP-25 report, "BWR Vessel Internal Project, BWR Core plate Inspection and Flaw Evaluation Guidelines," identifies that the loss of preload over time in core plate hold-down bolts due to stress relaxation is considered as a time-limited aging analysis (TLAA). Therefore, the staff requests that the applicant make a commitment to provide a TLAA analysis for the core plate-hold down bolts to the staff for review and approval prior to entering into license renewal period. The applicant shall provide a commitment to sub. The staff expects that this analysis shall use projected neutron fluence values to the end of the extended period of operation. Since core plate wedges are not installed at CNS, consistent with the inspection guidance specified in item 10 of Table 3-2 of the BWRVIP-25 report, the applicant shall continue enhanced visual inspection (EVT-1) of the core plate hold-down bolts. Therefore, the staff requests that the applicant confirm that it will continue performing EVT-1 of the core plate hold-down bolts and use ultrasonic testing (UT) from a location above the core plate when the UT technique is developed by the industry.

RAI 4.1-2

Background
Title 10, Section 54.21(c)(1), of the *Code of Federal Regulations* (10 CFR 54.21(c)), requires that the applicant provide an evaluation of TLAA and a list of the TLAA applicable to the plant as defined in 10 CFR 54.3, "Definitions." CNS LRA Section 4.1, Identification of TLAA, discusses the TLAA process and Table 4.1.1 lists the CNS TLAA.

Issue
Through review of the LRA and the TLAA documentation including CNS License Renewal Report CNS-RPT-07-LRD03, Revision 1, TLAA and Exemption Evaluation Results, and in discussions with CNS cognizant personnel, the staff identified or was informed that certain CNS items involving calculations or analyses were not determined to be a TLAA. The staff review of these items indicates that a TLAA may be required.

Request
Please review the following items for the appropriateness of their being addressed as TLAA or not. If determined to not be a TLAA, please justify why.

1. Review the BWRVIP items in LRA Appendix C, Response to BWRVIP Applicant Action Items, in particular BWRVIP-25 (4) regarding susceptibility of the rim hold-down bolts to stress relaxation.

2. Review Items in CNS-RPT-0-LRD03, Revision 1, Attachment 4 – Updated Safety Analysis Report Results, in particular:

    a. Section # IV-6.3 Description (isolation valve)

    b. Section # VI-4.1.1 High Pressure Coolant Injection System Components

    c. Section A-3.1.2 Corrosion and Erosion

3. Also identify where corrosion allowance is described and is not contained in a TLAA. Address how corrosion allowances are incorporated in AMP, and the basis for it.

RAI 4.3.1-8

Background
Note 2, beneath LRA Table 4.3-2, indicates there are 12 components in the reactor vessel which were exempted from cumulative usage factor (CUF) calculation as per the guidance of Paragraph N-415.1 of the 1965 edition of Section III of the American Society of Mechanical Engineers (ASME) Code.

Issue
LRA Table 4.3-2 shows the CUF for Class 1 components. All critical components within Class 1 pressure boundary must have usage evaluated.

Request
Please provide Paragraph N-415.1 of ASME III (1965 edition) and show the basis that the targeted components could be exempted from fatigue evaluation.

RAI 4.3.1-9

Background
LRA Section 4.3.1.3 states that no plant-specific fatigue analysis of the entire reactor vessel internals was performed. In addition, in the same paragraph, the LRA states that the only time-limited aging analysis (TLAA) associated with fatigue of the reactor vessel internals at Cooper Nuclear Station (CNS) are the analyses for the core plate plugs.

Issue
Even though being non-pressure boundary components, Class 1 components are subject to fatigue requirements. For old vintage plants, there may be cases where explicit fatigue usage evaluation are not required, Reactor Vessel Internals were implicitly designed for low cycle fatigue based upon the reactor coolant system design transient projections for 40 years. Therefore, the staff believes fatigue for reactor vessel (RV) internals is a TLAA.

Request
Provide basis to justify why only core plate plugs were identified as TLAA.

RAI 4.3.1-10

Background
This item has two components:

(a) In Section 4.3.1 of the LRA, it states that "… For CNS, two transients (normal startup and turbine roll) are expected to exceed their analyzed value prior to the end of the period of extended operation. Specifically, normal startups project to reach the analyzed number of cycles for the feedwater piping, feedwater nozzles, main steam piping and core spray piping during the period of extended operation… ".

(b) In addition, LRA Section 4.3.1.1 states that the actual numbers of transient cycles remain within analyzed values used for reactor vessel fatigue analyses.

Issue
(a) It appears that the quoted statement in the first part of Background requires some clarification.

(b) In addition, Table 4.3-1 shows that the projected 60-year cycles for the startup and Turbine roll transients exceed the analyzed cycles, which contradicts what the LRA Section 4.3.1.1 stated.

Request
(a) Provide basis, for the two particular transients mentioned in the first part of Background, why only the feedwater piping, feedwater nozzles, main steam piping and core spray piping would exceed the analyzed number of cycles and other components would not.

(b) Please correct the inconsistency between the LRA Section 4.3.1.1 statement summarized in the second part of Background and the transient cycle condition summarized in the second part of Issue.

RAI 4.3.1-11 (Formally 4.3.1-7, the requested information has not been provided by the applicant)

Background
LRA Section 4.3.3 discusses TLAA concerning effects of reactor water environment on fatigue life. LRA Table 4.3-3 shows the projected 60-year environmentally assisted fatigue usage, environmentally assisted fatigue CUF, as well as the 60-year projected CUF without considering the reactor water effects, and the Fen values for all NUREG/CR-6260 locations. Note 1, which is intended for the results of the 60-year CUF without considering the reactor water effects, states that the values were "recalculated for license renewal by removing conservatism and using the projected 60-year cycles from Table 4.3-1".

Issue
Clarification required. In addition, LRA Table 4.3-3 reported Fen value for Alloy 600. The LRA made no mention about how it was calculated.

Request
(a) Specify the elements that constitute the "conservatism", and describe analysis methods used in the recalculation that helped you to achieve the goal for lowering the CUF value.

(b) Please explain why "removing conservatism" couldn't bring down 60-year CUF for Core spray reactor vessel nozzle as expected. In fact, the recalculated value is now much greater than the 40-year design CUF.

(c) Provide technical basis that supports the calculation of Fen for Alloy 600.

RAI 4.6-1

Background
10 CFR 54.21 (c) require that each LRA must contain an evaluation of TLAA. In Section 4.6 of the CNS LRA, the applicant has referenced CNS Plant Unique Analysis Report for Mark 1 Containment Program and Fatigue Management Program as the basis for satisfying the requirements 10 CFR 54.21(c).

Issue
The staff needs to review the CNS Plant Unique Analysis Report for Mark 1 Containment Program to determine if the TLAA for the CNS torus shell, supports, and vent system comply with the requirements of 10 CFR 54.21(c).

Request
Provide a copy of the CNS Plant Unique Analysis Report, Mark I Containment Program, Revised, February 26, 2007 (Reference 4.6.1 in the CNS LRA).

RAI 4.7-1

In TLAA Section 4.7.1, the applicant stated that the current analysis for the core plate plugs is valid for 32 EFPY (effective full power years) and these plugs are susceptible to radiation embrittlement, fatigue, spring relaxation and intergranular stress-corrosion cracking (IGSCC). The CUF related to fatigue analysis exceeds the maximum limit of 1.0 before the CNS unit reaches 54 EFPY. Hence, the staff requests that the applicant provide a new analysis that

takes into account the aforementioned aging effects for the extended period of operation. This analysis requires staff's approval prior to entering into the extended period of operation. If too many holes are to be plugged, an explanation is required to justify this modification as plugging too many core plate holes may lessen the core bypass flow resulting in boiling in the spaces between fuel channels.

RAI B.1.9-4

(Follow up to RAI B.1.9-3)

Background
According to GALL AMR line item IV B1-14, cumulative fatigue evaluation as part of a TLAA for core shroud components is recommended.

Issue
In Section 5.5 of the applicant's report CR-CNS-07-LRD04, "CNS Licensing Renewal Project – TLAA-Mechanical Fatigue," the applicant stated that the fatigue evaluation of the core shroud components is not based on the life of the plant and, therefore, it is not a TLAA.

Request
Provide an explanation for not performing TLAA evaluation for the core shroud components. If this is not a TLAA, how the degradation due to fatigue is managed for the core shroud components.

RAI B.1.31-1

Background
LRA Section B1.31 states each inspection or test occurs at least once every five years. The staff noted that the corresponding portion of CNS-RPT-07-LRD07, Revision 2, "Aging Management Program Evaluation Results - Non-Clases 1 Mechanical," Section 4.8, "Periodic Surveillance and Preventive Maintenance," stated each inspection or test occurs at least once every 10 years. In addition, the staff noted in Attachment 2 of the same report, the inspection of the high pressure coolant injection turbine lube oil cooler heat exchanger tubes was specified as once every six years.

Issue
Based on the information provided to the staff, it is not clear at what frequency the noted inspections or tests will be performed.

Request
Provide information to confirm the frequency of each inspection or test discussed in LRA Section B1.31 for the periodic surveillance and preventive maintenance program.

RAI B.1.38-2

Background
LRA Section B.1.38, "Water Chemistry Control – Auxiliary Systems" description states in part: "Program activities include sampling and analysis of water in auxiliary condensate drain system components, auxiliary steam system components, and heating and ventilation system components to minimize component exposure to aggressive environments."

Under "3. Parameters Monitored/Inspected," it states in part: "In accordance with industry recommendations, auxiliary condensate drain system and auxiliary steam system water parameters monitored are pH, conductivity, phosphate, sulfite, and iron." Furthermore, it also states that "In accordance with industry recommendations, heating and ventilation systems parameter monitored is sodium nitrite ($NaNO_2$)."

Under "10. Operating Experience," it states in part: "The results for the condensate and steam system indicated no variance form limits in pH or conductivity with occasional variance in iron, phosphate and sulfite. Also, the results for the admin chiller system indicated no variance from limits in conductivity with occasional variance in sodium nitrites."

Issue

- It is not clear to the reviewer the reason(s) why a plant-specific water chemistry control program is necessary for the auxiliary systems.

- The LRA did not include a reference to the aforementioned industry recommendations.

- The LRA did not provide details on the equipment operating characteristics (e.g., boiler pressure), parameter monitoring program (e.g., frequency of water samples being collected), or description on those incidences where the parameters (e.g., phosphate and sulfite for the boilers, and sodium nitrites for the admin chillers) exhibited variance and the associated corrective actions to return them within the limits.

Request
Please provide more details on (i) steam pressure, (ii) frequency of the water samples being collected, (ii) the nature, frequency of those incidences where variances had occurred, as well as the outcome and efficacy of the corrective actions.

RAI B.1.40-4

Background
LRA Section B.1.40 states the chemistry activities for this program are based on Electric Power Research Institute (EPRI) TR-1007820, "Closed Cycle Cooling Water Chemistry," Revision 1, dated April 2004, which supersedes EPRI TR-107396, "Closed Cycle Cooling Water Chemistry Guideline," Revision 0, issued November 1997. GALL AMP XI.M21, "Closed-cycle Cooling Water System," states that it "relies on maintenance of system corrosion inhibitor concentrations within the specified limits of EPRI TR-107396 to minimize corrosion and stress-corrosion cracking."

Issue
The GALL Report does not recommend the use of late revisions of EPRI TR-107396. The applicant's program is implemented using the later revision, EPRI TR-1007820, rather than the edition referenced in the GALL Report, EPRI TR-107396. The staff noted the use of EPRI TR-1007820 may potentially impact the program elements, "Preventative Actions" and "Acceptance Criteria" of the applicant's program, since the corresponding program elements in the GALL Report reference the limits on corrosion inhibitor concentrations specified in EPRI TR-107396.

Request

Justify this deviation from the GALL Report and discuss its impact on the program elements, Preventative Actions and Acceptance Criteria, with reference to limits on specific corrosion inhibitor levels, monitoring frequencies, and operating parameters.