Progress Energy

Serial: RNP-RA/03-0133

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United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23

COMMENTS ON DRAFT SAFETY EVALUATION REPORT FOR LICENSE RENEWAL

Ladies and Gentlemen:

By letter dated June 14, 2002, Carolina Power & Light (CP&L) Company, now doing business as Progress Energy Carolinas, (PEC) Inc., submitted an application for renewal of the Operating License for the H. B. Robinson Steam Electric Plant (HBRSEP), Unit No. 2, which is also referred to as the Robinson Nuclear Plant (RNP).

By letter dated August 25, 2003, the NRC provided a "Safety Evaluation Report with Open Items Related to the License Renewal of the H. B. Robinson Steam Electric Plant, Unit 2," (also referred to as the SER) and requested that PEC review the SER to verify its accuracy. Attachment II to this letter provides comments related to the accuracy of the SER.

PEC would like to take this opportunity to make a clarification to the submittal dated September 16, 2003. In Attachment II of that letter, commitment Items 4 and 6 both refer to the ASME Section XI, Subsection IWB, IWC and IWD Program. In fact, commitment Item 6 applies to the Reactor Head Closure Studs Program. The remainder of the information concerning commitment Item 6 is as stated in Attachment II of the September 16 letter.

If you have any questions concerning this matter, please contact me.

Sincerely,

C. T. Baucom
Supervisor – Licensing/Regulatory Programs

Progress Energy Carolinas, Inc.
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MHF/mhf

Attachments:

I. Summary of Key Acronyms
II. Comments on Draft Safety Evaluation Report

c: Mr. T. P. O'Kelley, Director, Bureau of Radiological Health (SC)
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Summary of Key Acronyms	
ACRONYM	**MEANING**
AMR	Aging Management Review
ATWS	Anticipated Transient Without Scram
AMP	Aging Management Program
CLB	Current Licensing Basis
CVCS	Chemical and Volume Control System
CUF	Cumulative Utilization Factor
CASS	Cast Austenitic Stainless Steel
CSS	Containment Spray System
DBD	Design Basis Document
DFOST	Diesel Fuel Oil Storage Tank
DG	Diesel Generator
DSD	Dedicated Shutdown Diesel
EDB	Equipment Data Base
EAF	Environmentally Assisted Fatigue
EOF/TSC	Emergency Operating Facility/Technical Support Center
FMP	Fatigue Monitoring Program
FOS	Fuel Oil System
FP	Fire Protection
HX	Heat Exchanger
IGSCC	Intergranular Stress Corrosion Cracking
I&C	Instrument and Control
LR	License Renewal
LRA	License Renewal Application
MIC	Microbiologically Induced Corrosion
NEI	Nuclear Energy Institute
OE	Operating Experience
PWSCC	Primary Water Stress Corrosion Cracking
RAI	Request for Additional Information
RFO	Refueling Outage
RCP	Reactor Coolant Pump
RCPB	Reactor Coolant Pressure Boundary
RNP	Robinson Nuclear Plant
RV	Reactor Vessel
SBO	Station Blackout
SC	Structures and Components
SCC	Stress Corrosion Cracking
SER	Safety Evaluation Report

Summary of Key Acronyms	
SG	Steam Generator
SRP-LR	Standard Review Plan – License Renewal
SS	Stainless Steel
SSC	Structures, Systems, and Components
TG	Turbine Generator
TLAA	Time Limited Aging Analysis
UFSAR	Updated Final Safety Analysis Report
VHP	Vessel Head Penetration

COMMENTS ON DRAFT SAFETY EVALUATION REPORT

SECTION 1 COMMENTS

1.6 Summary of Confirmatory Items

Confirmatory Item 3.3.2.4.17-1 (aging effects for the components in the dedicated shutdown diesel generator)

This confirmatory item relates to the aging effects for the materials and environments associated with the components in the dedicated shutdown diesel generator. In RAI 3.3.17-1, the staff requested the applicant to provide a detailed discussion on the AMR performed for the stainless steel valves, piping, tubing and fittings listed in Table 3.3-2, row numbers 12, 13, and 23, and explain why the AMR results are different among them. In its response, the applicant stated that the air and gas environments in row numbers 12 and 13 include the potential for wetting of stainless steel by untreated water, which is the genesis of the potential aging effects. A detailed explanation of the response has been included in Section 3.3.2.4.17 of this SER. The staff found the referenced explanation appropriate. However, the applicant is requested to provide the above information under oath and affirmation, and this remains as a Confirmatory Item 3.3.2.4.17-1.

Confirmatory Item 3.3.2.4.19-1 (aging effects for the components in the fuel oil system)

This confirmatory item relates to the aging effects for the materials and environments associated with the components in the fuel oil system. In RAI 3.3.17-1, the staff requested the applicant to provide a detailed discussion of the AMR performed for the stainless steel valves, piping, tubing and fittings listed in Table 3.3-2, row numbers 12, 13 and 23, and explain why the AMR results are different among them. The air and gas environments in row numbers 12 and 13 include the potential for wetting of stainless steel by untreated water, which is the genesis of the potential aging effects. In row number 23, the environment is considered a reasonably dry environment which results in no potential aging effects for stainless steel. For the fuel oil system, it has a stainless steel valve and instrumentation tubing, valves, and fittings that are conservatively modeled in a wetted outdoors environment. The fuel oil tank level instrumentation is located outdoors and has components that are near the ground. A detailed explanation of the response has been included in Section 3.3.3.4.19 of this SER. The staff found the referenced explanation appropriate. However, the applicant is requested to provide the above information under oath and affirmation, and this remains as Confirmatory Item 3.3.24.19-1.

Comment 1-1

The RAI referenced in these Confirmatory Items, RAI 3.3.17-1, does not exist in the correspondence for the RNP LR review.

1.7 Summary of Proposed License Conditions

As a result of the staff=s review of the RNP application for license renewal, including the additional information and clarifications submitted subsequently, the staff identified two proposed license conditions. The first license condition requires the applicant to include the UFSAR Supplement in the next UFSAR update required by 10 CFR 50.71(e) following issuance of the renewed license. The second license condition requires that the future inspection activities identified in the UFSAR Supplement be completed prior to the period of extended operation.

Comment 1-2

Commitment 45 requires testing during the period of extended operation, rather than prior to the period of extended operation as stated in section 1.7, above. This is reflected in the revised UFSAR Supplement wording from the response to RAI 4.5-2 below. The second license condition should reflect this.

> As a result of the above response, the following paragraph is added to LRA Subsection A.3.2.4, Containment Tendon Loss of Prestress:
>
> > "To provide additional assurance of the tendons design capacity, testing (at integrated leak rate test pressure) similar to the Structural Integrity Test performed in 1992 will be scheduled to coincide with Appendix J containment integrated leak rate testing conducted during the period of extended operation (required frequency in accordance with 10 CFR 50, Appendix J). The monitoring criteria for these tests will be limited to deformations and cracking associated with the vertical prestressed tendons, and will not include radial monitoring. Guidelines for performing the IWL examinations for these tests will include additional emphasis on looking for a pattern of horizontal cracks, and additional cracking in the discontinuity areas."

SECTION 2 COMMENTS

2 Scoping and Screening Methodology for Identifying Structures and Components Subject to an Aging Management Review, and Implementation Results

2, Paragraph 6

By letter dated June 14, 2002, the applicant submitted its request and application for renewal of the operating license for RNP. As an aid to the staff during the review, the applicant provided evaluation boundary drawings that identify the functional boundaries for systems and components within the scope of license renewal. These evaluation boundary drawings are not part of the license renewal application (LRA).

On February 11, 2003, the staff issued requests for additional information (RAIs) regarding the applicant=s methodology for identifying SSCs at RNP that are within the scope of license renewal and subject to an AMR, and the results of the applicant=s scoping and screening process. By letter dated April 28, 2003, the applicant provided responses to the RAIs.

Comment 2-1

The Supplement to Application for Renewal of Operating License submitted in RNP-RA/02-0159, dated October 23, 2002 should be included. Therefore, please add a new sentence to paragraph 6:

> "By letter dated October 23, 2002, the applicant provided supplemental LRA information concerning Interim Staff Guidance for fire protection system aging management, station blackout, aging management of concrete components, and 10 CFR 54.4(a)(2)."

Comment 2-2

The original RAIs were supplemented with additional RAIs transmitted by letter dated February 21, 2003. Therefore, please add a new sentence following the penultimate sentence in paragraph 7 to read:

> "This was supplemented by RAI letter dated February 21, 2003."

2.1.2.1.2 Documentation Sources Used for Scoping and Screening

In Sections 2.1.1.1, 2.1.1.2, and 2.1.1.3 of the LRA, the applicant stated that information derived from the CLB, design and licensing basis documents, DBDs, the UFSAR, plant drawings, the Q-List, the Maintenance Rule Database, and the EDB was reviewed during the license renewal scoping and screening process. The applicant used this information to identify the functions performed by plant systems and structures. These functions were then compared to the scoping criteria in 10 CFR 54(a)(1-3) to determine if the associated plant system or structure performed a license renewal intended function. These sources were also used to develop the list of SCs subject to an AMR.

Comment 2.1-1

Since the title of this subsection includes screening, the screening sections of the LRA should be added: 2.1.2.1, 2.1.2.2, and 2.1.2.3.

2.1.2.2.3 Electrical and Instrumentation and Controls (I&C) Screening

The LRA states that following component level scoping for electrical I&C systems, the applicant performed screening to identify those electrical/I&C components that were subject to an AMR. In Section 2.1.2.3, AElectrical and I&C Systems,@ of the LRA, the applicant described the methodology used to screen electrical and I&C components.

Comment 2.1-2

Please revise the first sentence to read:

> "The LRA states that screening of electrical and I&C system components was performed differently than for mechanical and structural components."

Scoping of electrical systems was done at the system level; therefore, component level scoping was not done. Scoping of systems and structures in accordance with Subsection 2.1.1 of the LRA applies to electrical and I&C systems, as well as mechanical systems. See steps 1 and 2 of LRA Subsection 2.1.2.3.

2.1.3.1.1 Application of the Scoping Criteria in 10 CFR 54.4(a)

Comment 2.1-4

2.1.3.1.1, paragraph 7, in the discussion of 10 CFR 54.4(a)(2), mentions the October 23, 2003, Supplement to the LRA. Please include in the discussion of 10 CFR 54.4(a)(3), a sentence to note that supplemental information was provided by applicant letter dated October 23, 2003. For example add the following to paragraph 2 under 10 CFR 54.4(a)(3):

> "Also, by letter to the NRC dated October 23, 2003, the applicant responded to the Interim Staff Guidance (ISG-02) regarding scoping of equipment relied on to meet the requirements of the Station Blackout (SBO) Rule (10 CFR 50.63) for License Renewal (10 CFR 54.4(a)(3))."

2.1.3.2.1 Mechanical Screening

2.1.3.2.1, Paragraph 3

The applicant then determined the components within the system intended function boundary that performed an intended function without moving parts or without a change in configuration or properties. Active/passive screening determinations were based on the guidance in Appendix B to NEI 95-10. The passive, in-scope components that were not subject to replacement based on a qualified life or specified time period were identified as requiring an AMR. The determination of whether a passive, in-scope component has a qualified life or specified replacement time period was based on a review of plant-specific information including the EDB, maintenance programs, and procedures. The passive, in-scope components that are not subject to replacement based on a qualified life or specified time period (i.e., screening criterion of 10 CFR 54.21(a)(1)(ii)) were identified as requiring an AMR. The in-scope components identified as requiring an AMR were then compared to the NUREG-1801, AGeneric Aging Lessons Learned (GALL) Report,@ dated July 2001, to ensure that differences are valid and justified. The components that were determined to be within the scope of license renewal were identified and the component intended functions for in-scope components were identified. The component intended functions identified were based on the guidance of NEI 95-10.

Comment 2.1-5

Please delete the third from the last sentence, because the comparison to GALL mainly occurred during the aging management review. This statement should be removed from two other locations where it is used, i.e., paragraph three of Subsection 2.1.3.2.2, and paragraph four of Subsection 2.1.3.2.3.

2.2.1 Summary of Technical Information in the Application

This section addresses the plant-level scoping results for license renewal. Pursuant to (10 CFR 54.21(a)(1)), the applicant is required to identify and list SCs subject to an AMR. These are passive and long-lived SCs that are within the scope of license renewal.

In LRA Table 2.2-1, the applicant provided a list of the plant systems and structures and identified those that are within the scope of license renewal…(continued).

2.2.2 Staff Evaluation

2.2.2, Paragraph 2

To ensure that the scoping and screening methodology described in LRA Section 2.1 was properly implemented, and that the SCs that are subject to an AMR were properly identified, the staff performed an additional review. The staff sampled the contents of

the Updated Final Safety Analysis Report (UFSAR) based on the listing of systems and structures in LRA Table 2.2-1 to determine whether there were systems or structures that may have…(continued)

Comment 2.2-1

In SER Subsections 2.2.1 and 2.2.2, please identify all applicable tables of in-scope structures and systems from LRA Section 2.2, i.e., Tables 2.2-1, 2.2-2, and 2.2-3.

2.3 Scoping and Screening Results: Mechanical Systems

2.3, Paragraph b

b. Auxiliary Systems

Comment 2.3-1

Based on a comparison of the SER with RNP LRA, Subsections 2.3.3 and 2.3.4, four additional Auxiliary Systems should be added to the SER list, and a new section "d" should be added to list the Steam and Power Conversion Systems.

2.3.1.1.1 Summary of Technical Information in the Application

The applicant describes the reactor coolant system (RCS) piping in LRA Section 2.3.1.1 and provides a list of components subject to an AMR in LRA Table 2.3-1.

The applicant=s LRA contains the following description of the RCS.

Comment 2.3.1.1.1-1

The description provided for the RCS is not only from LRA Section 2.3.1.1, but some information is also from the UFSAR. This comment is applicable to other SER sections where additional information from the UFSAR was used together with information from the LRA, examples include SER Sections 2.3.1.2.1 and 2.3.1.3.1.

2.3.3.1.2 Staff Evaluation

2.3.3.1.2, Paragraph 5

By letter dated April 28, 2003, the applicant responded to RAI 2.3.3.1-2 by stating that the primary sampling system is not required for safe shutdown or to mitigate the consequences of an accident and is therefore classified as a non-safety-related system. However, the sample lines that interface with safety-related systems are provided with isolation valves, and those that penetrate the containment are provided with two isolation valves in series outside the containment which close upon actuation of the containment

isolation signal. The valves that are closed by the containment isolation signal are PS-956A through PS-956H. The valves that provide isolation to the safety-related systems are PS-951, PS-953, PS-955A through PS-955E, and PS-959. Manual valves PS-976, PS-977, PS-988, and PS989D are the safety-related boundary valves for the CVCS. Components of the primary sampling system downstream of valves PS-956B, PS-956D, PS-956F, PS-956H, PS-959, PS-976, PS-977, PS-988 and PS-898 are not safety-related.

<u>2.3.3.1.2, Paragraph 9</u>

The staff has reviewed the applicant=s response to RAI 2.3.3.1-2 and finds it acceptable. The response to RAI items (a), (b), and (c) is acceptable because the applicant identified that the subject piping does not require an AMR since it does not have a spatial interaction with safety-related equipment. The response to RAI items (d) and (e) is acceptable because the applicant identified the subject piping as in scope in the CVCS and subject to AMR. The response to RAI item (f) is acceptable because the applicant identified the subject piping as not safety-related and not subject to AMR.

Comment 2.3.3.1.2-1

SER Section 2.3.3.1.2 - In the last sentence of the paragraph 5, “PS-898” should be “PS-989D”.

Comment 2.3.3.1.2-2

SER Section 2.3.3.1.2 – Paragraph 9, the last paragraph, contains a misinterpretation. The staff evaluation states “The response to RAI items (d) and (e) is acceptable because the applicant identified the subject piping as in scope in the CVCS and subject to AMR.”

In response to RAI 2.3.3.1-2, RNP states that manual valves PS-976, PS-977, PS-988, and PS-989D are safety related boundary valves for CVCS. Although RNP has classified these valves as “Q-List” components, the valves do not have a license renewal intended function and are not “license renewal” boundary valves. Therefore, the piping described in RAI 2.3.3.1-2 items (d) and (e) are not in the scope of license renewal and are not subject to AMR.

2.3.3.15.2 Staff Evaluation

<u>2.3.3.15.2, Paragraph 4</u>

In LRA Section 2.3.3.15, the applicant describes the basis for including a component in the LRA.

- SCs that are safety related and are relied upon to remain functional during and following design-basis events
- SCs that are not safety related but whose failure could prevent satisfactory
- accomplishment of the safety-related functions
- SCs that are part of the Environmental Qualification Program
- SCs that are relied on during postulated fires

Comment 2.3.3.15.2-1

In 2.3.3.15.2, Paragraph 4, first sentence, the corresponding text in the LRA provides the basis for including the FP System in license renewal scope, not for inclusion of a component in the LRA.

2.3.3.19.1 Summary of Technical Information in the Application

2.3.3.19.1, Paragraphs 2 and 3

The FOS supplies fuel oil to the emergency diesel engines, the dedicated shutdown diesel engine, and the diesel engine-driven fire pump from fuel oil storage tanks on site. The fuel oil system also provides fuel oil to the EOF/TSC security diesel generator.
In LRA Table 2.3-25, the applicant identified the following components from the FOS as being within the scope of license renewal and subject to an AMR: (1) diesel generator fire pump fuel oil tank and oil storage tank oil filter, (2) dedicated shutdown diesel generator fuel oil day tank, fuel oil priming pump, fuel oil pumps, and fuel oil tank, (3) emergency diesel generator day tank vent filters, fuel oil day tanks, fuel oil duplex filters, fuel oil priming pumps, fuel oil storage tank, (4) EOF/TSC security diesel generator fuel oil day tank, fuel oil pump, main storage tank, (5) flow orifices/elements, (6) fuel oil transfer pumps, (7) turbine tanks, and (8) valves, piping, tubing, and fittings.

The applicant stated that the intended function common to all components listed above, with the exception of the intake filters, was to provide pressure-retaining boundary so that sufficient flow at adequate pressure is delivered. Other intended functions of components are, as stated, to provide filtration (oil storage tank and day tank vent filter, duplex filter, valves, piping, tubing, and fittings) and to provide structural support to safety-related components (valves, piping, tubing, and fittings).

Comment 2.3.3.19.1-1

In the sentence in paragraph 2 that begins with “In LRA Table 2.3-25,” replace the last “oil” with the word “vent” in Item (1), to coincide with the name of the second component on LRA Table 2.3-25, i.e., “(1) diesel generator fire pump fuel oil tank and oil storage tank vent filter.”

Comment 2.3.3.19.1-2

In the first sentence of paragraph 3, delete the words “with the exception of the intake filters.” All component commodities in LRA Table 2.3-25 have the pressure retaining component intended function.

2.3.4.4.2 Staff Evaluation

2.3.4.4.2, Paragraph 4

By letter dated February 11, 2003, the staff requested (via RAI 2.3.4.4-1) the applicant to provide the following information.

Comment 2.3.4.4.2-1

SER Section 2.3.4.4.2 – fourth paragraph, "(via RAI 2.3.4.4-1)" should read "(via RAI 2.3.4.4-1, RAI 2.3.4.4-2, RAI 2.3.4.4-3, and RAI 2.3.4.4-4)."

2.4.1.5 Staff Evaluation

2.4.1.5, Paragraphs 4 and 5

The applicant states that its determination of structures within the scope of license renewal was made by initially identifying RNP structures and then reviewing them to determine which structures satisfy one or more of the criteria contained in 10 CFR 54.4. The scoping results with respect to whether a structure is in scope or out of scope are listed in Table 2.2-2, ALicense Renewal Scoping Results for Structures,@ which contains 106 structures. In response to RAI 2.5.1.1, the applicant modified the switchyard relay building and switchyard and transformer structures from out of scope to in scope and added isolated phase bus duct yard support structures and 4 kV nonsegregated bus duct yard support in scope to Table 2.2-2. The SCs within the scope are then screened for conformance to the requirements contained in 10 CFR 54.21(a)(1). The SCs that meet the requirements contained in 10 CFR 54.21(a)(1) are identified as requiring an AMR for license renewal.

The applicant states that its methodology for screening SCs includes screening of components and commodities that have been transferred to the civil discipline from the mechanical and electrical disciplines. Evaluation boundaries between mechanical components, electrical components, and structures and structural components were coordinated between discipline reviewers. The types of components and commodities treated in this manner include pipe/component snubbers; fire damper penetration seals; electrical component supports; and electrical cabinets, consoles, cubicles, junction boxes, and panels.

Comment 2.4.1.5-1

As indicated in the first paragraph of RNP LRA, Section 2.4, the text in these paragraphs applies to all structures, not just containment. This information was not included in the staff evaluation section of the SER for other structures.

Comment 2.4.1.5-2

RAI 2.5.1-1 deals with equipment brought into scope for recovery from Station Blackout. Discussion of this RAI in the evaluation results for containment seems out of place;

consider moving the information concerning RAI 2.5.1-1 from paragraph 4 to the existing discussion of the SBO in SER Subsection 2.4.2.12.2.

2.4.2.5.1 Summary of Technical Information in the Application

2.4.2.5.1, Paragraph 3

Table 2.4-6 lists nine structural component types requiring an AMR, provides a reference to the results of the AMR for each component type, and identifies the following intended functions for the radwaste building.

- provide structural and/or functional support to non-safety-related equipment where failure of this structural component could prevent satisfactory accomplishment of any of the required safety-related functions
- provide structural support and/or shelter to components required for fire protection, ATWS, and/or SBO
- provide shelter/protection to safety-related equipment (including radiation shielding)

Comment 2.4.2.5.1-1

Please add the function "Serves as missile (internal or external) barrier" to the list of functions for the Radwaste Building in accordance with RNP LRA Table 2.4-6.

2.4.2.12.2 Staff Evaluation

2.4.2.12.2, Paragraph 3

Table 2.4-12 lists 20 structural component types that require an AMR. These structural component types include anchor bolt chair for tank foundation, anchorage/embedments (exposed surface), anchorage/embedments (embedded/encased in concrete), cable tray and conduit, concrete tank foundation, doors, electrical and instrument panels and enclosures, electrical component supports, electrical manhole, expansion anchors, manhole covers, masonry walls, miscellaneous steel structures (stairs, ladders, platforms, connectors, grating, and checker plate), pipe supports, protective enclosure, reinforced concrete (beams, walls, floors, columns, etc.), siding, structural steel (beams, plates, connectors, and columns), threaded fasteners, and underground conduit duct bank. On February 11, 2003, the staff requested the applicant in RAI 2.5.1-1 to explain why the screening results in section 2.5.1 did not include offsite power system structures or components. In response to RAI 2.5.1-1, on April 28, 2003, the applicant added battery rack and pilings as additional structural component types that are in scope and subject to an AMR to meet the requirement of 10 CFR 54.4(a)(3) with respect to the offsite power system SCs.

<u>2.4.2.12.2, Paragraph 8</u>

In response to RAI 2.4-1 and RAI 2.4-5, on April 28, 2003, the applicant stated that the S/G drain (flash) tank, refueling water storage tank, accumulator tanks, fuel oil storage tank, and their foundations are in scope and subject to an AMR, but the remaining tanks (namely, the chemical drain tank, waste holdup tanks, sump tank, gas decay tanks, spent resin storage tank, and the RCDT are mechanical components within the liquid waste processing system and the gaseous waste processing system that do not require an AMR…(continued)

Comment 2.4.2.12.2-1

The discussion of equipment added to scope to address RAI 2.5.2-1 should be updated in 2.4.2.12.2, Paragraph 3. RNP-RA/02-0159, dated October 23, 2002, added two components. The complete list from the RNP-RA/03-0031, dated April 28, 2003, includes the bus duct enclosures. The last sentence in paragraph 3 should be revised as follows to include the new structures.

> "In response to RAI 2.5.1-1, on April 28, 2003, the applicant provided a list supporting structures and Civil/Structural component/commodity groups which are required for restoration of offsite power. The switchyard relay building, switchyard and transformer structures, isolated phase bus duct yard support structures, and the 4 kV nonsegregated bus duct yard support structures were added as in scope. Electrical Bus Duct (enclosure), battery rack, and pilings were added to Table 2.4.12 as structural component types that are in scope and subject to an AMR to meet the requirement of 10 CFR 54.4(a)(3) with respect to the offsite power system SCs."

Comment 2.4.2.12.2-2

In 2.4.2.12.2, Paragraph 8, the RAIs listed in the first sentence are not correct; the correct RAIs are RAI 2.4.2-1 and RAI 2.4.2-5, instead of RAI 2.4-1 and RAI 2.4-5.

2.5 Scoping and Screening Results: Electrical/Instrumentation and Control Systems

<u>2.5, Paragraph 2</u>

The applicant performed the screening for electrical/I&C components on a generic component commodity group basis for the in-scope electrical/I&C systems. The in-scope electrical/I&C component commodity groups identified at RNP are listed below. Using the guidance provided in Nuclear Energy Institute (NEI) 95-10, Appendix B, the applicant identified the following passive, long-lived electrical components potentially subject to an AMR.

- electrical bus
- transmission conductors
- high-voltage insulators
- high-voltage surge arresters

C uninsulated ground conductors
C bus duct
$ insulated cables and connections (including splices, connectors, and terminal blocks)
$ electrical and I&C penetration assemblies

Comment 2.5-1

In order to address scoping and then screening in order, the following changes are suggested:

- Remove the first sentence which deals with screening.
- In the second sentence, state that the in-scope groups are listed in the table below, and note that the groups were identified using NEI 95-10, Appendix B, with the exception of those types that did not meet 10 CFR 54.4(a). (Refer to RNP LRA Section 2.5.1, paragraph one.)
- Move the list of bulleted items to after the table of in-scope commodity types. These are screening inputs and logically follow the table.

2.5.4.1 Summary of Technical Information in the Application

The applicant in Section 2.5 identified the components associated with offsite power recoveryB electrical bus, transmission conductors, high-voltage insulators, high voltage surge arresters, and uninsulated ground conductors. However, the applicant eliminated these components from further consideration based on their not meeting the license renewal scoping requirements of 10 CFR 54.4(a).

Comment 2.5.4.1-1

The discussion is accurate, however, it is suggested that the first sentence be stated more generally:

> "The applicant in Section 2.5 identified the components potentially in scope for license renewal, including those associated with offsite power recovery B electrical bus, transmission conductors, high-voltage insulators, high voltage surge arresters, and uninsulated ground conductors."

The requested changes are based on the scoping and screening information provided in RNP LRA Subsection 2.5.1, which shows that these commodity types were considered but did not meet scoping requirements.

SECTION 3 COMMENTS

3.0.3.1.2 Staff Evaluation

In LRA Section B.3.19, AMetal Fatigue of Reactor Coolant Pressure Boundary (Fatigue Monitoring Program),@ the applicant described its program to manage fatigue of selected components in various NSSS and secondary systems at RNP. The LRA states that the FMP, with its described enhancement, is consistent with GALL Program X.M1, AMetal Fatigue of Reactor Coolant Pressure Boundary,@ with one exception regarding the pressurizer surge line. The pressurizer surge line was not shown to have an environmentally adjusted CUF less than 1.0; therefore, the pressurizer surge line fatigue effects will be managed by periodic examinations in accordance with the ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program. The staff confirmed the applicant=s claim of consistency during the AMP audit. Furthermore, the staff reviewed the deviation and its justification to determine whether the program, with the deviation, remains adequate to manage the aging effects for which it is credited. The staff also reviewed the updated final safety analysis report (UFSAR) supplement to determine whether it provides an adequate description of the revised program. In addition, the staff determined whether the applicant properly applied the GALL program to its facility.

Comment 3.0.3.1.2-1

The staff evaluation discusses the method to be used to manage pressurizer surge line fatigue as described in the LRA. However, while this plan for managing surge line fatigue was in the initial LRA, it has subsequently been modified by the June 13, 2003 response to RAI 4.3-10, as described in SER Section 4.3.2.3, Environmentally Assisted Fatigue Evaluation. A reference to this revised commitment should be made in section 3.0.3.1.2. The RAI response indicated that fatigue of the surge line will be managed using one or more of the following options:

- Further refinement of the fatigue analyses to maintain the EAF-adjusted CUF below 1.0.
- Repair of the affected locations.
- Replacement of the affected locations.
- Management of the effects of fatigue through the use of an augmented inservice inspection program that has been reviewed and approved by the NRC.

3.0.3.3.1 Summary of Technical Information in the Application

The applicant discusses its AMP for water chemistry in LRA Section B.2.2, AWater Chemistry Program.@ The Water Chemistry Program is credited for aging management of selected components in systems and structures at RNP. The following aging effects and mechanisms are of concern.

$ cracking due to stress-corrosion cracking

Comment 3.0.3.3.1-1

In the first bullet discussing aging effects managed by the Water Chemistry Program, please change “cracking due to stress-corrosion cracking” to “cracking due to stress-corrosion cracking, IASCC” to match the discussion in B.2.2 on page B-11 of the LRA.

3.0.3.5.2 Staff Evaluation

<u>3.0.3.5.2, Paragraph 9</u>

The staff finds the applicant=s response to RAI B.3.3-1 acceptable because the applicant has identified and repaired the appropriate system piping that is covered under the Flow-Accelerated Corrosion Program. The components covered in the program are consistent with the commodity group in GALL 2.3.

<u>3.0.3.5.2, Paragraph 13</u>

In its response to RAI B.3.3-2b, the applicant stated that an NRC inspection was performed from April 27 to May 1, 1992, which resulted in NRC Inspection Report No. 50-261/92-13. The NRC found the Flow-Accelerated Corrosion Program at the time to be weak with little corporate direction and a need for program enhancements. The NRC performed a follow up inspection in September 1993 and noted significant program improvements as discussed in NRC Inspection Report No. 50-261/93-20.

Comment 3.0.3.5.2-1

In the last sentence of paragraph nine, “GALL 2.3” apparently should read “LRA 2.3.” GALL does not use section numbering that would correspond to section 2.3; however, the LRA includes a section 2.3.

Comment 3.0.3.5.2-2

In paragraph 13, the discussion should reference “RAI B.3.3-2c” instead of “RAI B.3.3-2b.”

3.0.3.11.3 Conclusions

On the basis of its review and audit of the applicant=s program, the staff finds that those portions of the program for which the applicant claims consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions to the GALL program and finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Comment 3.0.3.11.3-1

In the first paragraph of Section 3.0.3.11.3, the staff states that “the applicant claims consistency with GALL.” The above paragraph also discusses exceptions to the GALL. However, since the Systems Monitoring Program is not a program described in GALL, RNP does not claim consistency with GALL. Likewise, RNP does not take exception to GALL.

3.0.3.12.2 Staff Evaluation

<u>3.0.3.12.2, Paragraph 2</u>

Program Scope: The LRA states that the program provides for periodic inspection and testing of components in various systems and structures. In its April 28, 2003, response to staff=s RAI B.3.18-2, the applicant provided a summary of activities in various systems and components that are credited for management of specific aging effects, along with any planned enhancement. In particular, the program provides for periodic component replacement/refurbishment, inspection, and testing of components in the following systems and structures: (continued)

Comment 3.0.3.12-1

In SER Section 3.0.3.12.2, please add to the list of systems, under Program Scope, the Primary and Demineralized Water System. This system was added in response to Open Item 2.3.3.8-1.

3.0.4.1 Summary of Technical Information in Application

Chapter 3.0, "Aging Management Review Results," of the LRA provides an AMR summary for each unique structure, component, or commodity group at RNP determined to require aging management during the period of extended operation. This summary includes identification of aging effects requiring management and AMPs utilized to manage these aging effects.

Appendix B, Section B.1, "Aging Management Programs," of the LRA provides the aging management activity description for each activity credited for managing aging effects. These activities are based upon the aging management review results provided in Sections 3.1 through 3.6 of the LRA. The applicant stated that it uses the existing RNP quality assurance program to address the elements of corrective action, confirmation process, and administrative controls for all of its AMPs. The RNP quality assurance program implements the requirements of 10 CFR 50 Appendix B. The applicant further states that these programs, credited for license renewal, encompass both the safety-related and non safety-related SSCs within the scope of license renewal.

New or enhanced aging management programs were identified in Appendix B Section B.1 of the LRA, provide descriptions of the specific attributes of corrective action,

confirmation process and administrative controls. All other programs are existing and the applicant confirmed that they were consistent with the guidance in NUREG-1801.

Comment 3.0.4.1-1

In the second paragraph, the final seven words should be changed to "SCs that perform an intended function for license renewal." This would make the statement consistent with that in Section B.1, paragraph seven, of the RNP LRA. The statement in the LRA is intended to eliminate SSCs that were scoped in but screened out, i.e., had no SCs requiring aging management review (e.g., TG Lube Oil in §2.3.4.3).

Comment 3.0.4.1-2

The meaning of the third paragraph is not clear and may need to be revised or deleted in its entirety.

Table 3.1-1

Staff Evaluation Table for RNP Reactor System Components in the GALL Report

Small bore RCS and connected systems piping (Table 3.1-1, AMR 6)	Crack initiation and growth due to SCC, IGSCC, and thermal and mechanical loading	Inservice Inspection; Water Chemistry; One-Time Inspection	Water Chemistry Program, ASME XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program	Consistent with GALL. GALL recommends further evaluation. (Section 3.1.2.2.4)

Alternate AMR entries for core support pads and RV bottomVHP nozzles are provided in AMRs 9 and 10 of LRA Table 3.1-2, which are evaluated in Sections 3.1.2.4.4.2 and 3.1.2.4.4.3 of this SER, respectively; CASS RCS piping (Table 3.1-1, AMR 10)	Crack initiation and growth due to SCC	Plant-specific	Water Chemistry Program	Consistent with GALL. GALL recommends further evaluation. (Section 3.1.2.2.7)

SG feedwater impingement plate and support (Table 3.1-1, AMR 14)	Loss of section thickness due to erosion	Plant-specific	Discussion section indicates that this GALL AMR is not applicable to RNP because RNP uses feed rings with J-nozzles for the corresponding component design	Consistent with GALL. GALL recommends further evaluation. (Section 3.1.2.2.10)

Pressurizer integral support (Table 3.1-1, AMR 29)	Crack initiation and growth due to cyclic loading	Inservice Inspection, loose parts monitoring and/or neutron noise monitoring	ASME XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program	Consistent with GALL. (Section 3.1.2.1)

Comment Table 3.1-1-1

In AMR 6, please include the One-Time Inspection Program as discussed in LRA Table 3.3-1, Item 6, and in SER Section 3.1.2.2.4.

In AMR 10, please remove the extraneous comment regarding alternate AMR entries for core support pads and RV bottom nozzles. This comment appears to belong in the staff evaluation column of AMR 9.

In AMR 14, please refer to Open Item 2.3.1.6-1 to document the review of the steam generator feedring and J-nozzles.

In AMR 29, the information in the column entitled AMP in GALL Report should be restricted to only the ISI Program in accordance with the pressurizer integral support information in NUREG-1801, Volume 1, Table 1.

Comment Table 3.1-1-2

As a generic comment applicable to SER Tables 3.X-1, the information contained in the tables should be standardized. For example, Tables 3.1-1 and 3.4-1 include AMR or line numbers based on the item numbers in LRA Table 3.1-1. The other tables do not include AMR or item numbers. Also, Table 3.1-1 lists items applicable to PWRs only, whereas, the other tables list both PWR and BWR items.

3.1.2.1 Aging Management Evaluations in the GALL Report That Are Relied On for License Renewal, and Which Do not Require Further Evaluation

<u>Item 24, Paragraph 4, second sentence</u>

The staff=s review of the applicant=s response to RAI B.4.1-1 indicates that the applicant has committed to continued participation in the Westinghouse Owner=s Group (WOG) and EPRI Material Reliability Project (MRP) activities on nickel-based alloys (refer to Item 31 of Attachment II to Serial RNP-RA/03-0031). The applicant=s commitment includes a commitment to implement any augmented activities that may be recommended by the WOG or the EPRIBMRP to address PWSCC of Inconel components and welds, as approved by the NRC, or any further requirements that may be imposed by the staff to resolve the issue of PWSCC in Class 1 Inconel base metal or weld components.

Comment 3.1.2.1-1

In accordance with the revised commitment 31 in Attachment II of RNP-RA/03-0074, dated June 13, 2003, please replace the reference to the Westinghouse Owner's Group (WOG) and EPRI Material Reliability Project (EPRI-MRP) with "industry" or "nuclear industry." This comment also impacts SER Section 3.1.2.3.2.2, which should be updated to reflect the latest commitment.

3.1.2.2.6 Changes in Dimension Due to Void Swelling

3.1.2.2.6, Paragraph 1, last sentence

For Westinghouse-designed light-water reactors with recirculating SGs, the corresponding AMRs for evaluating void swelling of the RV internal components are based on the guidelines in Section 3.1.2.2.6 of the SRP-LR and are identified in commodity group items B2.1-b, B2.1-f, B2.1-j, B2.2-b, B2.2-e, B2.3-b, B.2.4-b, B2.4-d, B2.5-b, B2.5-f, B2.5-i and B2.6-b of Table IV.B2 of GALL, Volume 2, respectively.

3.1.2.2.6, Paragraph 2, last sentence

This approach conforms to one of the two recommended approaches in the AMRs for commodity group items IV.B2.1-b, IV.B2.1-f, IV.B2.1-j, IV.B2.2-b, IV.B2.2-e, IV.B2.3-b, IV.B.2.4-b, IV.B2.4-d, IV.B2.5-b, IV.B2.5-f, IV.B2.5-i and IV.B2.6-b of Table IV.B2 of GALL, Volume 2.

Comment 3.1.2.2.6-1

In the last sentence of the first and second paragraphs of 3.1.2.2.6, “B2.5-i” should be “B2.5-l.” Section 3.1.2.2.6 is a discussion of Changes in Dimensions Due to Void Swelling. GALL Item B2.5-i is associated with loss of preload due to stress relaxation. The correct GALL Item should be B2.5-l.

3.1.2.2.9 Loss of Preload Due to Stress Relaxation

3.1.2.2.9, Paragraph 1, last sentence

For Westinghouse-designed light-water reactors with recirculating SGs, the corresponding AMRs for evaluating loss of preload due to stress relaxation of Westinghouse-design baffle/former bolts are based on the guidelines in Section 3.1.2.2.9 of the SRP-LR and are identified in commodity group item IV.C2.4-c of GALL, Volume 2.

Comment 3.1.2.2.9-1

In the first paragraph of Section 3.1.2.2.9, the staff refers to GALL commodity group item IV.C2.4-c. The correct commodity group item for the subject component/aging effect is IV.B2.4-h.

3.1.2.2.10 Loss of Section Thickness Due to Erosion

3.1.2.2.10, Paragraph 2

In AMR Item 14 of LRA Table 3.1-1, the applicant stated that the RNP SGs use feed rings with J-nozzles but that the feed rings perform no license renewal intended function. The applicant did not provide any AMP or aging effect associated with the feed rings in

Table 3.1-1 of the LRA. However, in Item IV.D1.1-e of GALL, the feedwater inlet ring and support were identified as components for aging management. Therefore, in RAI 3.1.2.2.10-1, the staff requested the applicant to clarify whether the feed ring and support need to be included in Table 3.1-1 of the RNP LRA.

3.1.2.2.10, Paragraph 5

On the basis of its review, pending satisfactory resolution of open item 2.3.1.6-1, the staff finds that the applicant has adequately evaluated the management of the loss of section thickness due to erosion for components in the reactor systems, as recommended in the GALL Report. (continued)

Comment 3.1.2.2.10-1

In paragraph 2, the staff references Item IV.D1.1-e of GALL for the feedwater inlet ring and support. Item IV.D1.1 applies to impingement plates and supports; the correct GALL item for feed rings and supports is IV.D1.3-a.

Comment 3.1.2.2.10-2

In response to Open Item 2.3.1.6-1, RNP has agreed to include the feed rings/J-nozzles in scope for license renewal. The detailed response to Open Item 2.3.1.6-1 was provided in letter RNP-RA/03-0103, dated September 16, 2003.

3.1.2.2.11 Crack Initiation and Growth due to Primary Water Stress-Corrosion Cracking, Outer-Diameter Stress-Corrosion Cracking, or Intergranular Attack, Loss of Material Due to Wastage and Pitting Corrosion, Loss of Section Thickness Due to Fretting and Wear, or Denting Due to Corrosion of Carbon Steel Tube Support Plate

3.1.2.2.1, Paragraph 13

In its response to RAI 3.1.2.2.11-1, the applicant stated that no sleeves have been installed in the RNP SGs. The degradation mechanisms in the SGs can be found in the applicant's response to RAI B.2.4-2b. The type of plugs currently installed in the RNP SGs can be found in the applicant's response to RAI B.2.4-2a.

3.1.2.2.1, Paragraph 18

The tube support plate design for the RNP replacement SGs was selected to minimize the potential for tube denting. The design is discussed in the RNP response to RAI 3.1.2.2.12-1. The RNP replacement SGs are discussed in more detail in the RNP response to RAI B.2.4-2. The staff finds the applicant's response to RAI 3.1.2.2.11-2 acceptable because the applicant has provided the technical basis to show that NRC Bulletin 88-02 does not apply to the RNP replacement SGs. RAI 3.1.2.2.11-2 is resolved.

Comment 3.1.2.2.11-1

The third sentence of paragraph 13 should say:

"The type of plugs currently installed in the RNP SGs can be found in the applicant's response to RAI 3.1.2.2.11-1c."

Comment 3.1.2.2.11-2

The sentence "The RNP replacement SGs are discussed in more detail in the RNP response to RAI B.2.4-2" appears to need clarification. RAI B.2.4-2 requested information regarding aging mechanisms, corrective actions and tube plugs. It is suggested that this sentence be deleted or revised to reflect the information in the RAI.

3.1.2.2.13 Ligament Cracking due to Corrosion

3.1.2.2.13, Paragraphs 5 and 6

The applicant stated that the GALL Report indicates that this component/commodity group is applicable to CE SGs, and is therefore not applicable to RNP. The staff believes that ligament cracking due to corrosion could occur in SG tube support plates depending on the type of support plate configurations and operating experience, regardless of the vendor. In RAI 3.1.2.2.13-1, the staff requested the applicant to clarify the type of tube support plate configuration used in the RNP SG designs and whether the RNP tube support plates are susceptible to ligament cracking, thereby requiring aging management for this aging effect. RAI 3.1.2.2.13-1 is applicable to the determination as to whether ligament cracking due to corrosion is an aging effect for the RNP SGs. In the RAI, the staff informed the applicant that the applicant's response to RAI 3.1.2.2.12-1 will provide information to resolve this issue, how ever, the resolution of RAI 3.1.2.2.13-1 will depend on an acceptable resolution of RAI 3.1.2.2.12-1.

Section 3.1.2.2.13 of the SRP-LR discusses ligament cracking that can occur in carbon steel components of the SG tube support plates. The applicant's response to RAI 3.1.2.2.12-1 indicates that the tube support plate configurations in the RNP SGs are fabricated from stainless steel. The staff therefore concludes that ligament cracking is not an applicable aging effect for the SG tube support plate designs used at RNP. Based on this analysis, the staff concludes that the applicant's response to RAI 3.1.2.2.12-1 resolves the question asked in RAI 3.1.2.2.13-1 and considers RAI 3.1.2.2.13-1 to be resolved.

Comment 3.1.2.2.13-1

The cited paragraphs make reference to RAI 3.1.2.2.13-1 in five places. However, the information requested was provided in the response to RAI 3.1.2.2.12-1. These paragraphs should be corrected to replace the references to RAI 3.1.2.2.13-1 with RAI 3.1.2.2.12-1, and revised so that it is clear that there was only one RAI involved in resolving this issue.

3.1.2.3.1.3 UFSAR Supplement

In its response to RAI B.1-1, dated April 28, 2003, the applicant stated that it would incorporate the following statement into the UFSAR Supplement summary descriptions for those RNP AMPs that are determined to be consistent with the program attributes of analogous programs in Section XI.M of GALL, Volume 2:

> This program is consistent with the corresponding program described in the GALL Report. Based on the applicant=s response to RAI B.1-1, the staff concludes that the UFSAR Supplement for the Reactor Head Closure Studs Program is acceptable because it will reflect that the program attributes for the AMP are consistent with the corresponding program attributes recommended by the staff in GALL Program XI.M3, ?Reactor Head Closure Studs.@

Comment 3.1.2.3.1-1

The sentence starting with “Based on...” should not be part of the quote from the RAI response.

3.1.2.3.2.2 Staff Evaluation

<u>3.1.2.3.2.2, Paragraph 6</u>

This revision of the commitment has been reflected in the applicant=s revised Commitment Item No. 31, as given in Attachment II to Serial Letter No. RNP-RA/03-0031, dated April 28, 2003. This commitment indicates that the applicant=s inspection plan for the RNP Class 1 nickel-based alloy components and welds will be submitted for NRC review and approval prior to July 31, 2009.

<u>3.1.2.3.2.2, Paragraph 10</u>

Based the staff=s review of the applicant=s response to RAI B.4.1-1, the applicant=s revision to Commitment No. 31 in Attachment II to CP&L Serial Letter RNP-RA/03-0031, and the new inspection requirements for the RNP VHP nozzles, the staff concludes that there is reasonable assurance that the Nickel-Alloy Nozzles and Penetrations Program will be capable of managing PWSCC-induced degradation of Class 1 nickel-based alloy components and welds in the RCPB for RNP. Based on this assessment, the staff concludes that the applicant=s Nickel-Alloy Nozzles and Penetrations Program is consistent with the program attributes in GALL Program XI.M11, ?Nickel-Alloy Nozzles and Penetrations,@ and is acceptable.

Comment 3.1.2.3.2.2-1

This section of the SER (3.1.2.3.2.2) should incorporate the information from Clarification G to RAI B.4.1-1, RAI 3.1.2.1-4, and RAI 3.1.2.1-5 contained in RNP-RA/03-0074, in addition to the information from RNP-RA/03-0031 already mentioned.

Comment 3.1.2.3.2.2-2

In the sixth and tenth paragraphs of this section, it states that revised Commitment 31 is contained in RNP-RA/03-0031. However, this commitment was revised again for Clarification G in RNP-RA/03-0074. Therefore, the Draft SER should refer to RNP-RA/03-0074.

3.1.2.3.7.4 Conclusions

On the basis of its review and audit of the applicant=s program, the staff finds that those portions of the program for which the applicant claims consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions to the GALL program and finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Comment 3.1.2.3.7.4-1

This is a plant-specific program that is based on the elements listed in the SRP; therefore, the SRP may be a more appropriate reference than the GALL. Note: This appears to be a generic issue in the SER for plant-specific program conclusions.

3.1.2.4.2 Reactor Coolant Pumps

Table 3.1-2 of the LRA provides AMRs for RCS components that the applicant has determined are not covered by the scope of corresponding AMR items in GALL, Volume 2, or are not consistent with the scope of corresponding AMR items in GALL, Volume 2. The applicant=s AMRs in Table 3.1-2 of the LRA do not include any additional AMRs for the RNP RCP casings fabricated from CASS. The staff=s evaluation of the applicant=s AMR for evaluating loss of fracture toughness in the RNP RCP casings is given in the staff=s evaluation of AMR Item 26 to LRA Table 3.1-1, as given in Section 3.1.2.1 of this SER. The staff=s evaluation of the applicant=s AMR for evaluating cracking due to SCC in the RNP RCP casings is given in the staff=s evaluation of AMR Item 10 to LRA Table 3.1-1, as given in Section 3.1.2.2.7 of this SER.

Comment 3.1.2.4.2-1

The discussion of RCP AMRs for thermal embrittlement should reference Table 3.1-1, Item 19, rather than Item 26, which pertains to boric acid corrosion.

3.1.2.4.3 Pressurizer

Table 3.1-2 of the LRA provides AMRs for RCS components that the applicant has determined are not covered by the scope of corresponding AMR items in GALL, Volume 2, or are not consistent with the scope of corresponding AMR items in GALL, Volume 2. The following AMRs in Table 3.1-2 of the LRA include the additional AMRs for the RCS pressurizer components.

$ AMR Item 2 in which the applicant evaluates loss of material due to crevice or pitting corrosion in austenitic stainless steel or nickel-based alloy reactor coolant system (RCS) components that are exposed internally to treated water or steam

$ AMR Item 13 in which the applicant evaluates the applicable aging effects for the internal surfaces of the pressurizer relief tank, which is fabricated from carbon steel

Comment 3.1.2.4.3-1

The bullet referring to AMR Item 13 relates to the Pressurizer Relief Tank (PRT) and not the Pressurizer. The PRT is discussed in Section 2.3.1.12 of the LRA along with Non-Class I Piping. On Page 2.3-9 of the LRA, in Table 2.3-1, the PRT is shown associated with Reactor Coolant System Piping and not the Pressurizer. Therefore, the PRT should be discussed in Section 3.1.2.4.1 of the SER.

3.1.2.4.5.5 Cracking Due to SCC in RV Incore Flux Thimble Tubes Fabricated from Nickel-Based Alloy Evaluation of AMR Item 16 to LRA Table 3.1-2

<u>Evaluation - Identification of Aging Effects, Paragraph 2</u>

Industry experience has demonstrated that nickel-based alloys which are exposed to reactor coolant are susceptible to the initiation of primary water stress corrosion cracking (PWSCC), which is a form of SCC that may occur even in the presence of high-quality, chemically-treated, borated water (Refer to Section 3.1.2.3.6 of this SER). Section IV.B2 of GALL, Volume 2, does not include a corresponding AMR analysis that identifies that cracking due to SCC is an applicable aging effect for Westinghouse incore flux thimble tubes that are fabricated from either stainless steel or nickel-based alloy and are exposed to borated water environments. The applicant has identified that cracking due to SCC is an applicable aging effect for the nickel-based alloy incore flux thimble tubes at RNP. This consistent with current industry experience on PWSCC of nickel-based alloy components and is acceptable

<u>Evaluation - Aging Management Programs, Paragraph 1</u>

In AMR Item 16 of LRA Table 3.1-2, the applicant credited only the Chemistry Control Program with managing SCC in the RNP RV neutron flux thimble tubes. (continued)

Comment 3.1.2.4.5-1

In the Section labeled: Evaluation - Identification of Aging Effects, there is a reference to Section 3.1.2.3.6 for industry experience regarding PWSCC for nickel-based alloys. However, Section 3.1.2.3.6 concerns the Reactor Vessel Surveillance Program.

Comment 3.1.2.4.5-2

In the Section labeled: Evaluation - Aging Management Programs, there is a reference to the “Chemistry Control Program.” The proper title is the “Water Chemistry Program.”

3.1.2.4.6.3 Loss of Material Due to Crevice or Pitting Corrosion and Cracking Due to SCC in SG Secondary Side Components Made from Nickel-Based Alloys Evaluation of AMR Item 4 of LRA Table 3.1-2

<u>EvaluationBAging Management Programs, Paragraph 2</u>

In AMR Item 4 of LRA Table 3.1-2 (LRA Page 3.1-36), the applicant identified the Water Chemistry Program as the only AMP to manage the aging effect of SCC and loss of material due to pitting/crevice corrosion in the RNP SG feedwater nozzle thermal sleeve safe ends and steam flow limiters. (continued)

Comment 3.1.2.4.6.3-1

In the Section labeled: Evaluation - Aging Management Programs, there is a reference to the LRA Page 3.1-36. The proper reference is LRA Page 3.1-33.

3.1.2.4.6.6 Loss of Material, Cracking, and Changes in Material Properties in SG Snubber Reservoir Components Evaluation of AMR Item 7 of LRA Table 3.1-2

<u>EvaluationBAging Management Programs, Paragraph 3</u>

Based on this analysis, the staff concludes that the Preventive Maintenance Program is an acceptable AMP for managing the aging effects that are applicable to the passive, structural SG snubber components. The Preventive Maintenance Program is discussed in Section B.3.18 of Appendix G of the LRA. The staff evaluates this program in Section 3.0.3 of the application.

Comment 3.1.2.4.6.6-1

In the Section labeled: Evaluation - Aging Management Programs, in the last paragraph of this section, there is reference to Appendix G of the LRA. The proper reference is Appendix B of the LRA.

3.1.2.4.6.7 Cracking Due to SCC in the SG Lower Head Divider Plate and SG Tubeplate Cladding That Is Fabricated from Nickel-based Alloy Evaluation of AMR Item 11 of LRA Table 3.1-2

Summary of Technical Information in the Application

The applicant provides its AMR for cracking due to SCC of the SG lower head divider plate and tubeplate (tubesheet) cladding in AMR Item 11 of Table 3.1-2 of the LRA. Section IV of GALL, Volume 2, does not have a corresponding AMR for cracking due to SCC in these secondary-side components.

EvaluationBIdentification of Aging Effects

Although GALL, Volume 2, does not have a corresponding AMR for cracking due to SCC in these secondary-side components, the AMR for commodity group item IV.D1.1-e states that cracking due to SCC is an applicable aging effect for the feedwater impingement plates and supports that are made from carbon steel and are exposed the secondary side coolant. While nickel-based alloys are normally designed to be resistant to the effects of SCC, the applicant has conservatively identified cracking due to SCC as an applicable aging effect for the steam flow limiters that are made from nickel-based alloy and are exposed to the secondary side coolant. (continued)

Comment 3.1.2.4.6.7-1

In the Sections labeled: Summary of Technical Information in the Application and Evaluation – Identification of Aging Effects, reference is made to secondary-side components and/or coolant. This appears to be inconsistent with the title of the Section which refers to primary-side components such as SG tubeplate cladding and the SG lower head divider plate.

3.1.2.4.6.8 Loss of Mechanical Closure Integrity/Loss of Material Resulting from Aggressive Chemical Attack in SG Secondary Manway and Handhole Bolting Made from Carbon Steel Evaluation of AMR Item 12 to LRA Table 3.1-2

<u>EvaluationBIdentification of Aging Effects, Paragraph 3</u>

In RAI 3.1.2.4.6.8-1, the staff requested the applicant to provide its technical basis for concluding that loss of preload is not an applicable aging effect for the SG secondary side manway and handhole bolting components. In the RAI, the staff requested the applicant to amend its AMR for these components (AMR Item 12 of Table 3.1-2 of the LRA) and to propose an acceptable AMP if loss of preload due to stress relaxation is

determined to be an applicable aging effect for the SG primary and secondary side manway and handhole bolting components. In RAI 3.1.2.4.6.8-2 , the staff asked the applicant to confirm that either the yield strengths (and not minimum yield strengths) for heats of material used to fabricate the SG secondary side manway and handhole bolts, as ascertained from the certified material test reports (CMTRs) for the materials, are less than 150 ksi, or that the hardness levels for the bolting materials are less than 32 on a Rockwell C hardness scale, as ascertained from the CMTRs.

Conclusions

The applicant has provided its AMR for loss of mechanical closure integrity/loss of material resulting from aggressive chemical attack in SG secondary manway and handhole bolting made from carbon steel in AMR Item 12 of Table 3.1-2 of the LRA. The staff has reviewed the applicant=s evaluation for AMR Item 12 of Table 3.1-2 and its response to RAI 3.1.2.4.6.8-1 and RAI 3.1.2.4.6.8-2. The staff requires further information for completion of its determination for this AMR item. The staff=s determination for AMR 12 of LRA Table 3.1-2 is pending acceptable resolution of RAI 3.1.2.1-3 by Confirmatory Item 3.1.2.1-1, Part 1.

Comment 3.1.2.4.6.8-1

In Section labeled: Evaluation – Identification of Aging Effects, paragraph three, and in Section labeled: Conclusions, RAI 3.1.2.4.6.8-1 should be RAI 3.1.2.4.6-3, and RAI 3.1.2.4.6.8-2 should be RAI 3.1.2.4.6-4.

3.2.2.4.2.2 Staff Evaluation

Aging Management Programs

The applicant credited the following AMPs for managing the aging effects in the SI system.

- Water Chemistry Program
- Boric Acid Corrosion Program
- Open-Cycle Cooling Water System Program
- Closed-Cycle Cooling Water System Program
- Selective Leaching of Material Program
- Systems Monitoring Program

These AMPs are credited for managing the aging effects of components in several structures and systems and, therefore, are considered common AMPs. The staff has evaluated these common AMPs and has found them to be acceptable for managing the aging effects identified for this system. These AMPs are evaluated in Sections 3.0.3.3, 3.0.3.4, 3.0.3.7, 3.0.3.8, and 3.0.3.12, respectively, of this SER.

Comment 3.2.2.4.2-1

The Draft SER Section 3.2.2.4.2.2 reference to Section 3.0.3.12 should be replaced with Sections 3.0.3.10 and 3.0.3.11.

3.2.2.4.3 Containment Spray System

3.2.2.4.3.1, Aging Management Programs

The following AMPs are utilized to manage aging effects in the CSS.

$ Water Chemistry Prgram **C**SER Section 3.0.3.3
$ Boric Acid Corrosion Program **C**SER Section 3.0.3.4
$ Closed-Cycle Cooling Water System Program **C**SER Section 3.0.3.8
$ Systems Monitoring Program **C**SER Section 3.0.3.12

3.2.2.4.3.2, Aging Management Programs

The applicant credited the following AMPs for managing the aging effects in the CSS.

$ Water Chemistry Program
$ Boric Acid Corrosion Program
$ Closed-Cycle Cooling Water System Program
$ Systems Monitoring Program

These AMPs are credited for managing the aging effects of components in several structures and systems and, therefore, are considered common AMPs. The staff has evaluated these common AMPs and has found them to be acceptable for managing the aging effects identified for this system. These AMPs are evaluated in Sections 3.0.3.3, 3.0.3.4, 3.0.3.8, and 3.0.3.12, respectively, of this SER.

Comment 3.2.2.4.3-1

In Sections 3.2.2.4.3.1 and 3.2.2.4.3.2, a reference is made to SER Section 3.0.3.12 for the Systems Monitoring Program. The correct SER Section for the Systems Monitoring Program is 3.0.3.11.

3.2.2.4.4.1 Summary of Technical Information in the Application

Paragraph 5 in the Aging Effects discussion

The applicant determined that external surfaces of carbon steel valves are not susceptible to corrosion if they were located in areas protected from the weather, were not subjected to condensation, and were not subjected to aggressive chemical attack. The applicant determined that galvanized steel components, such as damper mounting, equipment frames and housings, and ductwork and fittings, would experience no age-related degradation requiring management in the environments of indoor not-air-

conditioned, containment air, and borated water leakage. In addition, SS components are not susceptible to any aging effects requiring management from exposure to indoor - not air conditioned, containment air, air and gas, borated water leakage, and outdoor. The applicant stated that the applicable RNP environments do not promote concentration of contaminants or include exposure to aggressive chemical species, and that boric acid is not an aggressive chemical species for SS.

Comment 3.2.2.4.4-1

It is suggested that the following be added to Section 3.2.2.4.4 to provide further justification and basis for the staff's conclusion:

"By letter dated February 11, 2003, the staff requested, in RAI 3.3-4, the applicant to provide the basis for not considering boric acid corrosion as an applicable aging effect for galvanized steel components included in Table 3.3-1, Row Number 20. The response was provided by letter dated April 28, 2003. The staff=s evaluation of the applicant=s response is documented in Section 3.3.2.5.4 of this SER, and is characterized as resolved."

3.2.2.4.5.1 Summary of Technical Information in the Application

3.2.2.4.5.1, Aging Effects, Paragraph 2

Stainless steel components are identified as being subject to loss of material due to crevice and pitting corrosion and MIC from exposure to raw water. Stainless steel components are identified as being subject to loss of material from crevice and pitting corrosion when exposed to treated water (including). Carbon steel components are identified as being subject to loss of material due to aggressive chemical attack, and loss of mechanical closure integrity from loss of material due to aggressive chemical attack. Aluminum components are identified as being subject to loss of material due to aggressive chemical attack, crevice corrosion, and pitting corrosion from exposure to borated water leakage.

Comment 3.2.2.4.5-1

In the second paragraph of the discussion of aging effects in Section 3.2.2.4.5.1, the parenthetical expression (including) should read (including steam).

3.2.2.4.5.2 Staff Evaluation

Aging Effects

3.2.2.4.5.2, Aging Effects, Paragraph 2

For the containment isolation system, LRA Table 3.2-1, Item 3, states that pitting and crevice corrosion are not a credible aging mechanism for the exterior bottom of the SS RWST, in part, because the tank bottom sits on a layer of oiled sand. The staff=s RAI is

provided in RAI 3.2.1-3 for the issue of potential corrosion of tank bottom. The staff=s discussion of this RAI and its resolution by the applicant are provided in Section 3.2.2.2.3 of this SER.

Comment 3.2.2.4.5-2

The exterior bottom of the SS RWST, the interior tank bottom, and the layer of oiled sand are not applicable to this system. The RWST should be mentioned in Section 3.2.2.4.2 for the Safety Injection System.

Table 3.3-1

Staff Evaluation Table for RNP Auxiliary System Components Evaluated in the GALL Report

Spent fuel storage racks and valves in spent fuel pool cooling and cleanup	Crack initiation and growth due to SCC	Water Chemistry	Water Chemistry (for managing pitting and crevice corrosion)	The spent fuel storage racks are scoped under structures and are addressed in Section 3.5.2.4.3 of this SER. The valves in SFPCS (see Section 3.3.2.4.9.2 below)
Neutron absorbing sheets in spent fuel storage racks	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex Monitoring	Boraflex Monitoring	These components are scoped under structures and are addressed in Section 3.5.2.4.3 of the SER.
Cranes including bridge and trolleys and rail system in load handling systems	Loss of material due to general corrosion and wear	Overhead Heavy Load and Light Load Handling Systems	Overhead Heavy Load and Light Load Handling Systems Program	These components are scoped under structures and are addressed in Section 3.5.2.4.2 of this SER.
Components in compressed air system	Loss of material due to general and pitting corrosion	Compressed Air Monitoring	Preventive Maintenance Program	Consistent with GALL (see Section 3.3.2.1 below)
Components in diesel fire system	Loss of material due to galvanic, general, pitting, and crevice corrosion	Fire Protection and Fuel Oil Chemistry	B.3.1 - Fire Protection Program	Consistent with GALL for FP, PM should confirm with Fuel Oil Chemistry Program

Comment Table 3.3-1-1

The two table rows associated with spent fuel storage racks include the statement that the racks are scoped under structures and are addressed in Section 3.5.2.4.3.

However, Section 3.5.2.4.3 does not address the spent fuel racks. The AMR for these racks is documented in LRA Table 3.3-1, Items 11 and 12.

The table row associated with neutron absorbing sheets (Boraflex) in spent fuel storage racks should note that this review involves a TLAA and Confirmatory Issue 4.6.4-1.

The row associated with cranes refers to SER Section 3.5.2.4.2. However, that section does not evaluate cranes. The AMR for cranes is documented in LRA Table 3.3-1, Item 15.

The row associated with compressed air systems does not address the results of the RNP AMR, i.e., that the aging mechanisms proposed in NUREG-1801 are not applicable.

The row associated with components in the diesel fire system should include the Fuel Oil Chemistry Program in the column for AMPs in LRA. Also, the AMP number has been included with the AMP title for the Fire Protection Program and the Fire Water System Program, but not for other AMPs on the table.

3.3.2.3.1.2 Staff Evaluation

<u>3.3.2.3.1.2, Paragraphs 2 and 3</u>

The applicant did not specifically identify the service class (such as Crane Manufacturers Association of America, Inc. (CMAA) Specification #70 or #74) to which cranes within the scope of license renewal were designed. In RAI B.3.6-1 the staff asked the applicant to provide this information. In its response dated April 28, 2003, the applicant provided the design requirements for the cranes, and indicated that the cranes will have low fatigue usage factors at the end of the extended operating period. The staff finds the applicant=s response acceptable because the fatigue evaluations, in accordance with the CLB, will remain valid for the period of extended operation.

Section B.3.6 of the LRA states that enhancements will be made in the scope of the program so that the cranes will be inspected using the attribute inspection checklist for structures. In RAI B.3.6-2, the staff asked the applicant to provide a summary of the attribute inspection checklist. In its response dated April 28, 2003, the applicant provided this attribute inspection checklist, which is summarized as follows.

$ Steel members, including baseplates, anchor bolts, and connections, are inspected for corrosion.

$ Damaged members, or connections and grout pads, are identified and inspected for deformation, tears, cracks, broken welds, loose bolts, etc.

$ Inspection of structural geometry focuses on identifying excessive deflection, cross-section distortion, or member misalignment. In addition, missing parts (including bolts, nuts, connectors, washers over slotted holed, etc.) and coating deficiencies are identified.

Comment 3.3.2.3.1-1

Section 3.3.2.3.1.2, second paragraph – The response to RAI B.3.6-1, dated April 28, 2003, has been superseded by a response dated June 13, 2003, which was transmitted via RNP-RA/03-0074. The latter response to the RAI provided the service classifications for the Polar Crane, Spent Fuel Cask Crane, and the Turbine Gantry Crane. The reference to low fatigue usage factors applies to the Polar Crane and the Spent Fuel Cask Crane as discussed in SER Section 4.3.6.1.

Therefore, SER Section 3.3.2.3.1.2, second paragraph, third sentence, should read as follows:

> "In its response dated June 13, 2003, the applicant provided the service classifications for the cranes. The Polar Crane and the Spent Fuel Cask Crane will have low fatigue usage factors at the end of the extended operating period."

Comment 3.3.2.3.1-2

Section 3.3.2.3.1.2, third paragraph – RAI B.3.6-2 requested the applicant to provide a summary of the attribute inspection checklist for cranes/structures. The response to this request, dated April 28, 2003, listed a seven bulleted attribute inspection checklist. The SER summarized the list into three bullets which could be misinterpreted. The listing provided in the response was taken from the actual system walkdown checklist. Therefore, SER Section 3.3.2.3.1.2, third paragraph, last sentence, and bullets should read as follows:

"In its response dated April 28, 2003, the applicant provided this attribute inspection checklist, which is as follows:

- Steel member and connection corrosion
- Damaged members or connections (deformation, tears, cracks, broken welds, loose bolts, etc.)
- Baseplate or anchor bolt corrosion
- Damaged or degraded grout pads
- Structure geometry to include excessive deflection, cross-section distortion, or member misalignment
- Missing parts (including bolts, nuts, connectors, washers over slotted holes, etc.)
- Coating deficiencies."

3.3.2.3.4.2 Staff Evaluation

<u>3.3.2.3.4.2, paragraph 5</u>

In its response to RAI B.3.8-1, the applicant stated that the fuel oil pipes that are covered under LRA B.3.8 include the following pipe lines 1-FO-36, 2-FO-21, 2-FO-58A, and 2-FO-58B. These line numbers represent carbon steel fuel oil pipe and fittings that are buried in soil or in contact with standing water. The pipes connect the Unit 1 internal combustion turbine tanks to the DSD fuel oil storage tank. They also connect the

outside diesel fuel oil storage tank to the emergency diesel generator day tanks. The bottom of these tanks are protected from the loss of material due to corrosion by the cathodic protection system. It should be noted that the above ground portion of the fuel oil tanks are discussed in LRA B.3.9, Aboveground Carbon Steel Tanks Program, which is evaluated in Section 3.3.2.3.5 of this SER.

3.3.2.3.4.2, paragraph 22

In its response to RAI B.3.8-6a, the applicant stated that the cathodic protection system is designed to protect the buried fuel oil piping, bottoms of the diesel fuel oil storage tank and the three Unit 1 internal combustion turbine fuel oil tanks, and the Unit 1 vertical lighting oil tank (not in LRA scope). The underground piping in the scope of this program is identified in the RNP response to RAI B.3.8 -1. Also, as noted in the RNP response to RAI B.3.12-3, NRC Inspection Report 50-261/91-21 discussed the inspection results of the emergency diesel generator fuel oil underground piping on March 27 and May 20, 1992. The piping examination demonstrated the piping coating was intact with no detectable piping degradation.

3.3.2.3.4.2, paragraph 32

The staff finds the applicant's response to RAI B.3.8-8 acceptable because the enhanced pressure testing meets the specifications of the ASME Code.

Comment 3.3.2.3.4.2-1

In Section 3.3.2.3.4.2, tanks protected by the cathodic protection system are only the tanks that are in contact with the ground. For example, the day tanks and DSD fuel oil storage tank are elevated tanks and would not be protected by this system. The tanks protected are the Unit 2 diesel fuel oil storage tank and the four Unit 1 IC turbine and vertical lighting oil tanks. The diesel generator day tanks are indoors and elevated and are therefore not protected.

Comment 3.3.2.3.4.2-2

The paragraph in Section 3.3.2.3.4.2 that discusses the RNP response to RAI B.3.8-6a should be corrected. The parenthetical phrase "(not in LRA scope)" should be deleted. A revision to RNP's documentation was made prior to the submittal of supplemental information (RNP-RA/03-0031) in which the normal flow path from Unit 1 to Unit 2 diesel fuel oil storage tank was added. When RNP records were updated for the addition of the new path, the vertical lighting oil tank was added to the scope of license renewal as part of the available seven day supply of fuel oil.

Comment 3.3.2.3.4.2-3

In the conclusion by the staff regarding the RNP response to RAI 3.8-8, the statement regarding "the enhanced pressure testing meets the specifications of the ASME Code" is not correct. The pressure drop testing at RNP is not done as a Code commitment.

3.3.2.3.5.1 Summary of Technical Information in the Application

3.3.2.3.5.1, Paragraph 3

The applicant experienced corrosion on a Unit 1 internal combustion turbine fuel oil tank which resulted in a loss of diesel fuel. The applicant concluded that the diesel fuel spill was due to an ineffective tank inspection program. The frequency at which past tank inspections had been performed could not be determined. Had the tanks been receiving inspections on an on-going basis, maintenance activities would have identified the potential for a leak. The tanks are now scheduled for inspections (external) on a five-year cycle. The leak was caused by pitting on the inside surface of the tank bottom. Therefore, this OE is applicable to internal tank corrosion. The applicant stated that corrosion of this type would be minimized by the Fuel Oil Chemistry Program, as opposed to the Aboveground Carbon Steel Tanks Program.

Comment 3.3.2.3.5-1

In the third paragraph of Section 3.3.2.3.5.1, the second sentence should be clarified to indicate the failure to detect the leakage was due to inadequate inspection and cleaning of the internal bottom of the tank. No external inspection would have prevented the leakage.

Comment 3.3.2.3.5-2

The fifth sentence should state the schedule for inspection (internal) is on a seven-year cycle. The Response to RAI B.3.9-2, Part A, dated April 28, 2003, provides additional explanation. The walkdown of the external, exposed surfaces of the carbon steel tanks in the scope of this program will satisfy the frequency criteria recommended in GALL Program XI.M29.

3.3.2.3.5.2 Staff Evaluation

3.3.2.3.5.2, Paragraph 16

The staff finds the applicant's response to RAI B.3.9-4 acceptable because the applicant stated that it performs walkdown inspection to ensure the satisfactory condition of the external coating of the tanks and the Fuel Oil Chemistry Program will protect the inside surface of the tanks from corrosion. The applicant's approach to tank inspection is consistent with GALL XI.M29.

Comment 3.3.2.3.5-3

This GALL program addresses only the external inspections. The SER should not make conclusions within this section regarding the internal inspections.

3.3.2.3.5.3 UFSAR Supplement

In LRA Section A.3.1.17, the applicant provides a UFSAR supplement summary for the Aboveground Carbon Steel Tanks Program which manages aging effects of loss of material for external surfaces of fuel oil system tanks. The program includes preventive measures to mitigate corrosion by protecting the external surface of carbon steel components, per standard industry practice, with protective paint or coating and with sealant or caulking, at the interface with soil or concrete. Visual inspections during periodic system walkdowns are performed to monitor degradation of the protective paint, coating, caulking, or sealant. For tanks in contact with the ground, the tank sits on a layer of oily sand and a cathodic protection system is provided. These measures assure that degradation is not occurring and that the component intended function will be maintained during the period of extended operation. Prior to the period of extended operation, the administrative controls for the program will be revised to indicate that the external surfaces of the fuel oil tanks are to be inspected periodically and to incorporate corrective action requirements.

Comment 3.3.2.3.5.3-1

The LRA does not state that caulking or sealant is used at the interface of the tank and soil. Also, please delete “soil or” at the end of the second sentence in the first paragraph of Section 3.3.2.3.5.3.

3.3.2.3.6.1 Summary of Technical Information in the Application

<u>3.3.2.3.6.1, Paragraph 3</u>

The applicant initiated a number of condition reports that resulted in improvements to the Fuel Oil Chemistry Program. One condition report summarizes a 1995 review of industry issues and how it relates to the RNP fuel oil system. The applicant has ensured the delivery of a high quality fuel supply to Unit 1 (and consequently to Unit 2 from Unit 1). The condition report provided a discussion of the measures taken to minimize biological growth in the diesel fuel oil storage tank to reduce the potential for fouling and provided a basis for not requiring biocide addition. As a follow-up to discovery of several through-wall pits in the Unit 1 internal combustion turbine lighting oil tank floor, the other three Unit 1 tanks were inspected, which are within the scope of the LR. One tank showed severe pitting. The other two tanks were found in excellent condition. The degraded tanks were repaired. The Unit 1 tanks are inspected periodically based on tank condition and corrective actions taken.

Comment 3.3.2.3.6-1

In the third paragraph of Section 3.3.2.3.6.1, please clarify that an AMR was performed for all tanks. Also, SER Comment 3.3.2.3.4.2-2; the vertical lighting oil tank was added to the scope of license renewal as part of the available seven day supply of fuel oil.

3.3.2.3.6.2 Staff Evaluation

3.3.2.3.6.2, Paragraph 5

In RAI B.3.10-1, the staff asked the applicant to specify each component and system that will be covered by the Fuel Oil Chemistry Program. In its response to RAI B.3.10-1, the applicant stated that the fuel oil system includes the storage of fuel oil and supply piping systems to the emergency DSD, dedicated shutdown diesel, and diesel fire pump. The specific components are discussed in Item 7 of LRA Table 3.3-1. These components include diesel fire pump fuel oil tank; dedicated shutdown diesel fuel oil day tank, fuel oil priming pumps, fuel oil pumps, and fuel oil tank; emergency DG fuel oil day tanks, fuel oil duplex filters, fuel oil hand priming pumps, and fuel oil storage tank; emergency operating facility DG fuel oil day tank, fuel oil pump; EOF/TSC main storage tank; flow orifices/elements; fuel oil transfer pumps; Unit 1 internal combustion turbine tanks; and valves, piping, tubing, and fittings.

Comment 3.3.2.3.6-2

In the fifth paragraph in Section 3.3.2.3.6.2, the second sentence should say: "In its response to RAI B.3.10-1, the applicant stated that the fuel oil system includes the storage of fuel oil and supply piping systems to the emergency, dedicated shutdown diesel, EOF, and diesel fire pump." This provides consistency with the list of components in the RNP response to RAI B.3.10-1.

3.3.2.3.6.2, Paragraph 20

In its response to RAI B.3.10-6b, -6c, -6d, and -6e, the applicant stated that no failures were identified in fuel oil tanks over a recent 10-year period in RNP. The applicant stated that an external inspection would not be expected to detect minor degradation on the inner surface of the tanks. However, it will identify minor leakage, which will precede the amount of degradation that would challenge the structural integrity of the tank. Formal inspections (see LRA Sections B.3.9, B.3.15, and B.3.17) will involve a walkdown of the tanks and the area surrounding the tanks. In addition to formal inspections, plant operators on rounds and chemistry personnel obtaining samples are able to identify such leakage. Such leakage would be identified and reported in the corrective action program.

Comment 3.3.2.3.6-3

RAI B.3.10-6 addresses the exception taken for inspection of small and elevated fuel oil tanks in the scope of the program, e.g., diesel fire pump fuel oil tank and emergency generator day tanks. When queried about the degradation history, the RNP response was in terms of these tanks and not all tanks within the program. There is no exception for the large storage tanks. For example, RNP reported degradation of the DFOST and the Unit 1 storage tanks due to pitting on the inside of the tank floors. The SER should reflect this.

<u>3.3.2.3.6.2, Paragraph 38 (Third paragraph under Detection of Aging Effects)</u>

In recent years, two of the Unit 1 internal combustion turbine tanks and the diesel fuel oil storage tank experienced degradation due to pitting. At that time, ultrasonic testing was done to establish the bottom condition. These tanks have since been repaired. The most recent tank repair was for the diesel fuel oil storage tank, which was repaired in fall 2002 during RFO-21. After the tank was drained, oil sludge was removed and the interior of the tank was pressure washed with high temperature water and citrus degreaser. The bottom of the tank was also sponge jet blasted. Ultrasonic testing measurements were taken at several locations, which established the condition of the tank bottom. No weld repairs of the pitting were required or performed. Belzona Ceramic-R-Metal compound was applied to the tank bottom and on the walls a few inches above the bottom. Provided this coating is shown to remain intact because it is an appropriate coating during subsequent tank inspections, corrosion is not anticipated and no further ultrasonic testing would be necessary. The 10-year inspection interval for the diesel fuel oil storage tank has proven to be adequate for identifying aging effects before damage occurs.

Comment 3.3.2.3.6-4

Please revise the second to last sentence to read:

“Provided this coating is shown to remain intact during subsequent tank inspections, corrosion is not anticipated and no further ultrasonic testing would be necessary.”

3.3.2.3.7.1 Summary of Technical Information in the Application

The applicant discusses it=s AMP for Buried Piping and Tanks Inspection in LRA Section B.3.12, ?Buried Piping and Tanks Inspection Program.@ The applicant states that the AMP is consistent with GALL XI.M34, ?Buried Piping and Tanks Inspection.@ The program is credited for aging management of selected components in systems at RNP. The aging effect/mechanism of concern is loss of material due to crevice, general, microbiological, pitting, and galvanic corrosion. The applicant also has a Buried Piping and Tanks Surveillance Program to manage the degradation of these components (see Section 3.3.2.3.4 of this SER).

Comment 3.3.2.3.7-1

In the last sentence of the first paragraph of 3.3.2.3.7.1, the statement suggests that aging management of all components in the scope of the Buried Piping and Tanks Inspection Program is also managed by the Buried Piping and Tanks Surveillance Program. However, only buried fuel oil piping performing an intended system function is managed by the surveillance program.

3.3.2.3.7.2 Staff Evaluation

3.3.2.3.7.2, Paragraph 25

In LRA B.3.12, the applicant states that the objective of the inspection program is to prevent, monitor, and mitigate exterior corrosion of the buried piping and tanks. However, the program does not address the integrity of the inside surface of the buried pipes. The staff understands that LRA B.3.10, Fuel Oil Chemistry Program, manages the aging effects on the inside surface of the buried fuel oil pipes; however, the Fuel Oil Chemistry Program does not specify the inspection of the inside surface of the buried fuel oil pipes. In RAI B.3.12-7, the staff asked the applicant to (a) discuss whether the Buried Piping and Tanks Inspection Program covers the inspection of the inside surface of the buried pipes, (if not, discuss whether there is an inspection program to ensure the integrity of the inside surface of the buried pipes); and (b) discuss the potential of corrosion occurring on the inside surface of the buried pipes.

Comment 3.3.2.3.7-2

The first sentence attributes the statement to the “applicant,” however, this is not stated in RNP LRA Section B.3.12.

3.3.2.4.1.1 Summary of Technical Information in the Application

Aging Effects

Components of the sampling systems are described in Section 2.3.3.1 of the submittal as being within the scope of LR, and subject to an AMR. Table 2.3-7, on page 2.3-31 of the LRA, lists individual components of the system including closure bolting, valves, piping, tubing, and fittings. Closure bolting and external surfaces of carbon steel components are identified as being subject to loss of material due to boric acid corrosion from exposure to borated water leaking from adjacent system or component containing borated treated water. Carbon steel, SS, and nickel-based alloy exposed to the reactor coolant water or oxygenerated water are subject to fatigue, cracking, and growth due to SCC and IGSCC, and loss of material due to crevice or pitting corrosion. Exposure of aluminum to ambient air and gas, and borated water leakage is identified as being subject to loss of material due to aggressive chemical attack, crevice corrosion, and pitting corrosion. Carbon steel components are identified as being subject to loss of material due to general, pitting, and crevice corrosion. Exposure of SS components to ambient air has no aging effects.

Comment 3.3.2.4.1-1

In Section 3.3.2.4.1.1, Aging Effects, aluminum is discussed; however, aluminum is not an identified material for component in the LRA for the sampling systems.

3.3.2.4.4.1 Summary of Technical Information in the Application

Aging Effects

Components of the CVCS are described in Section 2.3.3.4 of the submittal as being within the scope of LR, and subject to an AMR. Table 2.3-10, on pages 2.3-37 and 2.3-38, of the LRA lists individual components of the system including charging pump HX shell, regenerative HX shell and cover, charging pump HX tubing, charging pump HX water box, charging pump lube tanks, charging pump suction stabilizers and pulsation dampeners, charging pump(s), closure bolting, excess letdown HX shell and cover, excess letdown HX tubing, flow orifices/elements, regenerative HX tubing, shell and cover, seal injection filter, seal return filter, seal water HX shell and cover, seal water HX tubing, control volume tank, and valves, piping, tubing, and fittings.

Comment 3.3.2.4.4-1

In Section 3.3.2.4.4.1, “control volume tank” should be “volume control tank.”

3.3.2.4.4.2 Staff Evaluation

Aging Management Programs

The applicant credited the following AMPs for managing the aging effects in the CVCS.

- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (3.0.3.2)
- Water Chemistry Program (3.0.3.3)
- Boric Acid Corrosion Program (3.0.3.4)
- Bolting Integrity Program (3.0.3.6)
- Closed-Cycle Cooling Water System Program (3.0.3.8)
- One-Time Inspection Program (3.0.3.9)
- Systems Monitoring Program (3.0.3.12)
- Preventive Maintenance Program (3.0.3.13)

Comment 3.3.2.4.4-2

In 3.3.2.4.4.2, Aging Management Programs, a reference is made to Section “3.0.3.12” for the Systems Monitoring Program, and “3.0.3.13” for the Preventive Maintenance Program. The correct Sections are “3.0.3.11” and “3.0.3.12,” respectively.

3.3.2.4.8.1 Summary of Technical Information in the Application

Aging Management Programs

The following AMPs are utilized to manage aging effects in the primary and demineralized water system.

- Water Chemistry Program (B.2.2)

- One-Time Inspection Program (B.4.4)
- Systems Monitoring Program (B.3.17)
- Preventive Maintenance Program (B.3.18)
- Aboveground Carbon Steel Tank Inspection Program (B.3.9)

3.3.2.4.8.2 Staff Evaluation

Aging Management Programs

The applicant credited the following AMPs for managing the aging effects in the primary and demineralized water system.

- Water Chemistry Program (3.0.3.3)
- One-Time Inspection Program (3.0.3.9)
- Systems Monitoring Program (3.0.3.12)
- Preventive Maintenance Program (3.0.3.13)
- Aboveground Carbon Steel Tank Inspection Program (3.3.2.3.5)

With the exception of the Aboveground Carbon Steel Tank Inspection Program, these AMPs are credited for managing the aging effects of several components in other structures and systems and are, therefore, considered common AMPs. The staff has evaluated these common AMPs and found them to be acceptable for managing the aging effects identified for this system. These common AMPs are evaluated in Sections 3.0.3.3, 3.0.3.9, 3.0.3.12, and 3.0.3.13 of this SER. The Aboveground Carbon Steel Tank Inspection Program has been evaluated and found to be acceptable for managing aging effects identified for this system. The staff's evaluation of this AMP is documented in Section 3.3.2.3.5 of this SER.

Comment 3.3.2.4.8-1

Sections 3.3.2.4.8.1 and 3.3.2.4.8.2 identify the Preventive Maintenance Program and Aboveground Carbon Steel Tank Inspection Program for managing aging effects for the Primary and Demineralized Water System. As there are no tanks in the scope of license renewal for this system, the Aboveground Carbon Steel Tank Inspection Program does not apply. The Preventive Maintenance Program was not initially credited in the LRA for managing aging effects for the Primary and Demineralized Water System. However, as a result of RNP's response to Open Item 2.3.3.8-1, the scope of the Primary and Demineralized Water System requiring AMR was expanded to include deepwell components and piping. The Preventive Maintenance Program and Buried Piping and Tanks Inspection Program were utilized for aging management of the added deepwell piping and components. Therefore, the staff evaluation should include discussion of the expanded scope and additional programs utilized for the Primary and Demineralized Water System.

Comment 3.3.2.4.8-2

The correct Section for the "Systems Monitoring Program" is "3.0.3.11" instead of "3.0.3.12." This comment affects the AMPs listed in SER Sections 3.3.2.4.8.1 and 3.3.2.4.8.2.

Comment 3.3.2.4.8-3

In response to Open Item 2.3.3.8-1, RNP has agreed to include in the scope of license renewal the three deepwell pumps and associated piping required to provide a backup source of water for the auxiliary feedwater system. The detailed response to Open Item 2.3.3.8-1 was provided in letter RNP-RA/03-0103, dated April 28, 2003.

3.3.2.4.15.1 Summary of Technical Information in the Application

The description of the FP system can be found in Section 2.3.3.15 of this SER. The passive, long-lived components in this system that are subject to an AMR are identified in LRA Table 2.3-21. The components, aging effects, and AMPs are provided in LRA Tables 3.3-1 and 3.3-2.

<u>Aging Effects</u>

LRA Table 2.3-21, lists individual components that are within the scope of LR and subject to an AMR. The components include bolting, pump casings, ductwork, fittings, sprinklers, valves, piping, tubings, and filtration. Other items were identified during the responses to the RAIs, Strainers**C**Provides Filtration (RAI 2.3.3.15-9) and Flame Retardant Coatings**C**Loss of Material Due to Flaking (RAI 2.3.3.15-11). These items will be managed by the Preventive Maintenance AMP.

The LRA identifies that aluminum, SS, carbon steel, cast iron, concrete, copper, and flame retardant coatings are subject to loss of material due to general exterior corrosion, and carbon steel, low-alloy steel, and aluminum are subject to loss of material due to boric acid corrosion. Buried piping is subject to loss of material due to general pitting, crevice corrosion, and MIC. Doors, fire barrier penetration seals, and concrete are subject to loss of material due to wear, hardening and shrinkage due to weathering. Carbon steel and aluminum are subject to loss of material due to general pitting, crevice, and galvanic corrosion, MIC, and biofouling. Aluminum, bronze, brass, cast iron, and cast steel are subject to loss of material due to selective leaching.

Comment 3.3.2.4.15-1

The list of components in the first paragraph under Aging Effects omits fire hydrants, which are shown on RNP LRA Table 2.3-21.

Comment 3.3.2.4.15-2

The discussion in paragraph 2 of Aging Effects attributes inappropriate aging effects to concrete and flame retardant coatings. The first sentence of paragraph 2 states that

concrete and flame retardant coating are subject to loss of material due to general exterior corrosion. The third sentence identifies concrete as subject to loss of material due to wear, hardening and shrinkage due to weathering. Therefore, please remove concrete and flame retardant coatings from the first sentence of paragraph 2, and remove concrete from the last sentence paragraph 2. If concrete and flame retardant coating aging effects must be addressed, please consider the following wording:

> "Concrete is subject to cracking, change in material properties and loss of material. Flame retardant coatings are subject to loss of material due to flaking."

3.3.2.4.15.2 Staff Evaluation

3.3.2.4.15.2, Paragraph 3

In RAI 3.3.2-2, sent by letter dated February 11, 2003, the staff questioned why the fire hydrants were not included within the scope of LR. In its response dated April 28, 2003, the applicant clarified that the cast iron of fire hydrants is included in the carbon steel material group, and was included in LRA Table 3.3-1, Item 20 of the LRA. The staff finds this response reasonable and acceptable.

Comment 3.3.2.4.15-3

In the third paragraph, the draft SER states that RAI 3.3.2-2, sent by letter dated February 11, 2003, questioned why the fire hydrants were not included in scope. In fact, this RAI noted that hydrants were in scope, and questioned instead the reference to Table 3.3-1, Item 5 (carbon steel), instead of an AMR specifically addressing cast iron.

3.3.2.4.15.2 Staff Evaluation

Aging Management Programs, Paragraph 3

On the basis of its review of the information provided in the LRA, the staff concludes that the above identified AMPs will effectively manage the aging effects of the FPP.

Comment 3.3.2.4.15-4

In the third paragraph under the Aging Management Programs, the discussion should reference the Fire Protection System, not the Fire Protection Program (FPP).

3.3.2.4.16.1 Summary of Technical Information in the Application

Aging Effects, Paragraph 2

Carbon steel components in air and gas are identified as being subject to loss of material due to general, pitting, and crevice corrosion. Carbon steel components are identified as being subject to loss of material from general corrosion in indoor not-air-

conditioned and outdoor environments. Carbon steel in treated water (including steam) is identified as subject to loss of material due to general, pitting, and crevice corrosion. Carbon steel components in raw water are identified as being subject to loss of material from general, pitting, crevice, and galvanic corrosion, and MIC. Carbon steel in raw water and treated water (including steam) are identified as being subject to loss of material from selective leaching. Carbon steel components in treated water (including steam) are identified as being subject to loss of material due to galvanic corrosion and loss of heat transfer effectiveness from fouling of heat transfer surfaces.

Comment 3.3.2.4.16-1

The source of the statement in the last sentence of the second paragraph under Aging Effects is LRA Table 3.3-2, Item 15. Components and commodities from several auxiliary systems and in various environments were included in Item 15, because all of the applicable aging effects were managed by the Closed Cycle Cooling Water System Program. Although carbon steel heat exchanger shells in treated water were grouped in LRA Table 3.3-2, Item 15, only the aging effect of galvanic corrosion applies to them. This can be verified by LRA Table 2.3-22. None of the component/commodities on that table, that refer to Table 3.3-2, Item 15, have a heat transfer function. Therefore, if the above statement is intended to apply to auxiliary systems in general, no change is required. However, if the statement is intended to apply to the DG system only, it is suggested that statement be revised to delete the words "and loss of heat transfer effectiveness from fouling of heat transfer surfaces."

<u>Aging Effects, Paragraph 4</u>

Elastomer hose and couplings are located in the internal environments of air and gas, lubricating oil, FO, and treated water (including steam); and the external environments of indoor not air conditioned, containment air, borated water leakage, and outdoor. These components are identified as being subject to change in material properties, cracking, and loss of material from various degradation mechanisms.

Comment 3.3.2.4.16-2

The source of this statement is LRA Table 3.3-2, Item 5. Elastomers from several auxiliary systems and in various environments were included in Item 5, because all of the applicable aging effects were managed by the Preventive Maintenance Program. For the DG system, the applicable environments are indoors - not air conditioned and treated water. If this statement is intended to address elastomeric components in auxiliary systems in general, no change is required. If this statement is intended to address elastomeric components in the DG system only, it is suggested that the first sentence of this paragraph be revised to say:

> "Elastomer hose and couplings are located in the internal environment of treated water (including steam) and the external environment of indoor-not air conditioned."

3.3.2.4.16.1 Summary of Technical Information in the Application

Aging Management Programs

The following AMPs are utilized to manage aging effects in the DG system.

- Open-Cycle Cooling Water System Program (B.3.5)
- Closed-Cycle Cooling Water System Program (B.2.5)
- One-Time Inspection Program (B.4.4)
- Systems Monitoring Program (B.3.17)
- Preventive Maintenance Program (B.3.18)

Comment 3.3.2.4.16-3

LRA Table 3.3-1, Item 24, is referenced for components for the DG system in LRA Table 2.3-22. Table 3.3-1, Item 24, deals with the aging effect of selective leaching. Therefore, please add the Selective Leaching of Materials Program (B.4.5) to the list under Aging Management Programs.

3.3.2.4.16.2 Staff Evaluation

Aging Management Programs

The applicant credited the following AMPs for managing the aging effects in the DG system.

- Open-Cycle Cooling Water System Program (3.0.3.7)
- Closed-Cycle Cooling Water System Program (3.0.3.8)
- One-Time Inspection Program (3.0.3.9)
- Systems Monitoring Program (3.0.3.12)
- Preventive Maintenance Program (3.0.3.13)

These AMPs are credited for managing the aging effects of several components in other structures and systems and are, therefore, considered common AMPs. The staff has evaluated these common AMPs and found them to be acceptable for managing the aging effects identified for this system. The staff=s evaluation of these AMPs is documented in Sections 3.0.3.7, 3.0.3.8, 3.0.3.9, 3.0.3.12, and 3.0.3.13, respectively, of this SER.

Comment 3.3.2.4.16-4

Please add Selective Leaching of Material Program (3.0.3.10) to the list under Aging Management Programs. Also, please add Section 3.0.3.10 to the list of sections that document the staff’s evaluation of AMPs. The basis for this comment is documented in Comment 3.3.2.4.16-3.

3.3.2.4.17.1 Summary of Technical Information in the Application

Aging Effects, Paragraph 2

Stainless steel components in indoor air-conditioned, indoor not-air-conditioned, containment air, borated water leakage, and outdoor environments are identified as being subject to loss of material from pitting and crevice corrosion, and MIC. The applicant stated that boric acid is not an aggressive chemical species for SS. Stainless steel valves, piping, tubing, and fittings in indoor not-air-conditioned, and outdoor environments are identified as being subject to cracking from SCC.

Comment 3.3.2.4.17.1-1

The source of the information in this paragraph is LRA Table 3.3-2, Items 12 and 13. Components/commodities from several systems and in various environments were included in these items, because the applicable aging effects for stainless steel were managed by the Systems Monitoring Program. For the DSDG system, the applicable environment is indoors - not air conditioned. If this paragraph is intended to address components in auxiliary systems in general, no changes are necessary. If this statement is intended to address stainless steel components in the DSDG system only, it is suggested that the first and last sentences of this paragraph be revised to restrict the environment to indoor-not air conditioned. Note that the discussion of boric acid not being an aggressive chemical species for stainless steel, while true, is not applicable to DSDG system components.

3.3.2.4.17.1 Summary of Technical Information in the Application

Aging Effects, Paragraphs 4 and 5

Copper alloys in indoor not-air-conditioned or outdoor environments are identified as being subject to loss of material from pitting and crevice corrosion. Copper alloys in treated water (including steam) are identified as being subject to loss of material from selective leaching. Copper alloys are identified as being subject to loss of material from crevice corrosion in air and gas environments. Copper alloys in treated water (including steam) are identified as being subject to loss of material from crevice, pitting, and galvanic corrosion, and loss of heat transfer effectiveness from fouling of heat transfer surfaces.

Elastomer hose and couplings are located in the internal environments of air and gas, lubricating oil, FO, and treated water (including steam); and the external environments of indoor not-air-conditioned, containment air, borated water leakage, and outdoor. These components are identified as being subject to change in material properties, cracking, and loss of material from various degradation mechanisms.

Comment 3.3.2.4.17.1-2

In paragraph 4, the aging effects should include pitting as well as crevice corrosion in air and gas environments; the RNP aging effects tool generally considered both of these mechanisms to be present whenever one was present. Also, galvanic corrosion is not applicable in treated water (including steam) environment for DSDG copper alloy components. The source of the information regarding galvanic corrosion is LRA Table 3.3-2, Item 16. Components/ commodities from several systems and in various environments were included in this item, because the applicable aging effects were addressed by the same AMP, the Closed-Cycle Cooling Water System Program. For the DSDG system, galvanic corrosion should be deleted.

Comment 3.3.2.4.17.1-3

The source of the environmental data in paragraph 5 is LRA Table 3.3-2, Item 5. Components/commodities from several systems and in various environments were included in this item, because the applicable aging effects were addressed by the same AMP, the Preventive Maintenance Program. If this statement is intended to address elastomeric components in auxiliary systems in general, no change is required. If this statement is intended to address elastomeric components in the DSDG system only, the applicable internal environments should be revised to include only lubricating oil and treated water (including steam), and the external environments should be revised to include only indoor-not air conditioned and outdoor.

3.3.2.4.17.2 Staff Evaluation

Aging Management Programs, Paragraph 2

The first three AMPs are credited for managing the aging effects of several components in other structures and systems and are, therefore, considered common AMPs. The staff has evaluated these common AMPs and found them to be acceptable for managing the aging effects identified for this system. The staff's evaluation of these AMPs is documented in Sections 3.0.3.8, 3.0.3.12, and 3.0.3.13 of this SER, respectively. The Buried Piping and Tanks Inspection Program is a system-specific AMP. This AMP has been evaluated and found to be acceptable for managing aging effects identified for this system. The staff's evaluation of this AMP is documented in Section 3.3.2.3.4 of this SER.

Comment 3.3.2.4.17.2-1

Section 3.3.2.4.17.2, paragraph 2, states that the Buried Piping and Tanks Inspection Program is specific to a system. This program includes components from other systems, e.g., service water system and the fire protection system. Therefore, the distinction of a system-specific program would not apply.

3.3.2.4.18.1 Summary of Technical Information in the Application

Aging Effects

Table 2.3-24 of the LRA listed individual system components that are within the scope of LR and subject to AMR. The components include ductwork and fittings, intake filter, exhaust silencer, heaters, radiator, and valves, piping, tubing, and fittings.

Carbon steel components in indoor not-air-conditioned are identified as being subject to loss of heat transfer effectiveness from fouling of heat transfer surfaces. Carbon steel components in outdoor environments are identified as being subject to loss of material from general corrosion. Carbon steel components in treated water (including steam) are identified as being subject to general, pitting, and crevice corrosion. Carbon steel components in treated water (including steam) are identified as being subject to loss of material from galvanic corrosion, and loss of heat transfer effectiveness from fouling of heat transfer surfaces.

Copper alloys in treated water (including steam) are identified as being subject to loss of material from selective leaching. Copper alloys in treated water (including steam) are subject to loss of material from crevice, pitting, and galvanic corrosion, and loss of heat transfer effectiveness from fouling of heat transfer surfaces.

Elastomer hose and couplings are located in the internal environments of air and gas, lubricating oil, FO, and treated water (including steam); and the external environments of indoor not-air-conditioned, containment air, borated water leakage, and outdoor. These components are identified as being subject to change in material properties, cracking, and loss of material from various degradation mechanisms.

Comment 3.3.2.4.18-1

In paragraph 2 for carbon steel, the aging mechanism of galvanic corrosion should be deleted. The aging mechanism of galvanic corrosion in paragraph 2 is based on information from LRA Table 3.3-2, Item 15, which includes information from various components/commodities in various auxiliary systems. Components/commodities from several systems were included in this item, because the applicable aging effects were addressed by the same AMP, the Closed-Cycle Cooling Water System Program.

Comment 3.3.2.4.18-2

In paragraph 3 for copper alloys, the aging effects/mechanisms should be revised to delete galvanic corrosion and loss of heat transfer effectiveness from fouling of heat transfer surfaces. The aging mechanism of galvanic corrosion in paragraph 2 is based on information from LRA Table 3.3-2, Item 16, which includes information from various components/commodities in various auxiliary systems. Components/commodities from several systems were included in this item, because the applicable aging effects were addressed by the same AMP, the Closed-Cycle Cooling Water System Program.

Comment 3.3.2.4.18-3

In paragraph 4 for elastomers, please delete the internal environments of air and gas and fuel oil, and the external environments of containment air, borated water leakage, and outdoor.

The source of the environmental data in this paragraph is LRA Table 3.3-2, Item 5. Components/commodities from several systems and in various environments were included in this item, because the applicable aging effects were addressed by the same AMP, the Preventive Maintenance Program. If this statement is intended to address elastomeric components in auxiliary systems in general, no change is required. If this statement is intended to address elastomeric components in the EOF/TSC DG system only, the applicable internal environments should be revised to include only lubricating oil and treated water (including steam), and the external environments should be revised to include only indoor-not air conditioned.

3.3.2.4.18.1 Summary of Technical Information in the Application

Aging Management Programs

The following AMPs are utilized to manage aging effects in the EOF/TSC security DG.

- Closed-Cycle Cooling Water System Program (B.2.5)
- Systems Monitoring Program (B.3.17)

Comment 3.3.2.4.18-4

Please add the Preventive Maintenance Program (B.3.18) to the list under Aging Management Programs in SER Section 3.3.2.4.18.1. See LRA Table 2.3-24, AMR results reference to LRA Table 3.3-2, Item 5, for Valves, Piping, Tubing and Fittings.

3.3.2.4.18.2 Staff Evaluation

Aging Effects, Paragraph 3

By letter dated February 11, 2003, the staff requested, in RAI 3.3-4, the applicant to provide the basis for not considering boric acid corrosion as an applicable aging effect for galvanized steel components included in Table 3.3-1, Row Number 20. The staff's evaluation of the applicant's response is documented in Section 3.3.2.5.4 of this SER, and is characterized as resolved.

Comment 3.3.2.4.18-5

There is no boric acid in the vicinity of the EOF/TSC Security DG. This discussion is not relevant to this system.

3.3.2.4.18.2 Staff Evaluation

Aging Management Programs

The applicant credited the following AMPs for managing the aging effects in the EOF/TSC security DG.

- Closed-Cycle Cooling Water System Program (3.0.3.8)
- Systems Monitoring Program (3.0.3.12)

These AMPs are credited for managing the aging effects of several components in other structures and systems and are, therefore, considered common AMPs. The staff has evaluated these common AMPs and found them to be acceptable for managing the aging effects identified for this system. The staff's evaluation of these AMPs is documented in Sections 3.0.3.8 and 3.0.3.12, respectively, of this SER.

Comment 3.3.2.4.18-6

Please add the Preventive Maintenance Program to the list under Aging Management Programs in Section 3.3.2.4.18.2, and revise the numbering of the AMPs in accordance with SER Table 3.0.3-1.

3.3.2.4.19.1 Summary of Technical Information in the Application

3.3.2.4.19.1, Paragraph 2 and 3

The LRA identifies carbon steel, copper alloys and SS in air (ambient), and outdoor environments are identified as being subject to loss of material due to general, pitting, and crevice, corrosion, and/or MIC. Stainless steel, carbon steel and copper alloys in FO (with potential water contamination) are subject to loss of material due to general, pitting, and crevice corrosion, MIC and biofouling. The LRA also identifies SS components in ambient air, outdoor environments, and exposed to borated water leakage as being subject to loss of material due to pitting corrosion, crevice corrosion, and MIC, and cracking from SCC. Stainless steel components in indoor air-conditioned, indoor not-air-conditioned, containment air, borated water leakage, and outdoor are identified as being subject to loss of material from pitting and crevice corrosion and MIC. The applicant stated that boric acid is not an aggressive chemical species for SS. The RNP AMR assumed that external surfaces of SS components in indoor not-air-conditioned, containment air, air and gas, borated water leakage, and outdoor environments would not have aging effects requiring management. The applicant stated that the applicable environments do not promote concentration of contaminants or include exposure to aggressive chemical species, and that boric acid is not an aggressive chemical species for SS.

Elastomers and miscellaneous piping components are identified as being subject to change in material properties, hardening, cracking, and loss of strength due to elastomer degradation and loss of material due to various degradation mechanisms from exposure to ambient air and gas, treated water (including steam), and borated water leakage.

Buried carbon steel is subject to loss of material due to general, crevice corrosion, and pitting corrosion, and MIC. Exposure of SS and copper alloy components to ambient air, and fiberglass reinforced polyester components in the buried and outdoor environments, have no aging effects.

Comment 3.3.2.4.19-1

In paragraph 2, air (ambient) should be changed to indoor-not air conditioned in two places; RNP does not use air (ambient) as an environment.

In the first sentence of paragraph 2, the aging mechanisms for copper alloys and stainless steel components in the FO system are limited to pitting and crevice corrosion. The additional aging mechanisms listed are from LRA Table 3.3-1, Item 5, which combines information from NUREG-1801 for various systems and environments.

In the second sentence of paragraph 2, the aging mechanisms for copper alloys and stainless steel components in the FO system are limited to MIC. The additional aging mechanisms listed are from LRA Table 3.3-1, Item 7.

In the third and fourth sentences of paragraph 2, delete indoor-air conditioned, containment air, and exposed to borated water leakage. The source of this aging mechanism is LRA Table 3.3-2, Item 12, which combines information from several systems, however, none of the FO system components are located in air conditioned spaces or in containment or are subject to exposure to boric acid. Note that the discussion (in two places) of boric acid not being an aggressive chemical species for stainless steel, while true, is not applicable to FO system components.

In the discussion of external surfaces of stainless steel components, please include reference to the response to Confirmatory Item 3.3.2.4.19-1, in letter RNP-RA/03-0094, dated August 14, 2003.

Comment 3.3.2.4.19-2

In the first sentence of paragraph 3, please change loss of strength due to elastomer degradation to change in material properties due to various degradation mechanisms in accordance with LRA Table 3.3-2, Item 5. In paragraph 3, the environments to which elastomers and miscellaneous piping components are exposed should be limited to an external environment of indoor-not air conditioned and an internal environment of fuel oil. The source of the environmental data in this paragraph is LRA Table 3.3-2, Item 5. Components/commodities from several systems and in various environments were included in this item, because the applicable aging effects were addressed by the same AMP, the Preventive Maintenance Program. If this statement is intended to address elastomeric components in auxiliary systems in general, no change is required. If this statement is intended to address elastomeric components in the FO system only, the applicable environments should be revised.

In the last sentence of paragraph 3, air (ambient) should be changed to indoor-not air conditioned. RNP does not use air (ambient) as an environment.

Table 3.4-1

Staff Evaluation Table for RNP Steam and Power Conversion Systems Components Evaluated in the GALL Report

(4) Oil coolers in AFW system (lubricating oil side possibly contaminated with water)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion, and MIC	Plant specific	Preventive Maintenance Program	GALL recommends further evaluation (see staff evaluation in Section 3.4.2.2.5)

Comment Table 3.4-1-1

Row (4) lists only the Preventive Maintenance Program in the column for AMPs in LRA. The Open-Cycle Cooling Water System Program and the Water Chemistry Program should be included as discussed in Section 3.4.2.2.5.

3.4.2.3 Aging Management Programs for Steam and Power Conversion Systems

3.4.2.3, Paragraph 2

The applicant credits 10 AMPs to manage the aging effects associated with components in the steam and power conversion systems. All 10 of the AMPs are credited with managing aging for components in other system groups (common AMPs). The staff's evaluation of the common AMPs credited with managing aging in steam and power conversion systems components is provided in Section 3.0.3 of this SER. The common AMPs are listed here.

1. Metal Fatigue of Reactor Coolant Pressure Boundary Program - SER Section 3.0.3.1
2. Water Chemistry Program - SER Section 3.0.3.3
3. Boric Acid Corrosion Program - SER Section 3.0.3.4
4. Flow-Accelerated Corrosion Program - SER Section 3.0.3.5
5. Open-Cycle Cooling Water System Program - SER Section 3.0.3.7
6. Closed-Cycle Cooling Water System Program - SER Section 3.0.3.8
7. One-Time Inspection Program - SER Section 3.0.3.9
8. Selective Leaching of Material Program - SER Section 3.0.3.10
9. Systems Monitoring Program - SER Section 3.0.3.12
10. Preventive Maintenance Program - SER Section 3.0.3.13

Comment 3.4.2.3-1

The Systems Monitoring Program should be cross-referenced to SER Section 3.0.3.11, instead of 3.0.3.12. Preventive Maintenance Program should be cross-referenced to 3.0.3.12, instead of 3.0.3.13.

3.4.2.3.1 There are no plant-specific AMPs for the steam and power conversion systems.

Comment 3.4.2.3.1-1

Section 3.4.2.3.1 states there are no plant-specific AMPs for the steam and power conversion systems. However, the Systems Monitoring Program and Preventive Maintenance Programs are plant-specific and should be considered within this Section.

3.4.2.4.5.2 Staff Evaluation

Aging Management Programs

The following AMPs are utilized to manage aging effects to the main steam system.

- Boric Acid Corrosion Program
- Time-Limited Aging Analysis (10 CFR 54.21(c))
- Water Chemistry Program
- Systems Monitoring Program
- Flow-Accelerated Corrosion Program

Each of the above AMPs is credited with managing the aging of several components in different structures and systems and is, therefore, considered a common AMP. The staff's review of these common AMPs can be found in Section 3.0.3 of this SER.

Comment 3.4.2.4.5-1

Sections 3.4.2.4.5.2, 3.4.2.4.8.1, and 3.4.2.4.11.1 include TLAA as an AMP. The discussion states "the staff's review of these common AMPs can be found in Section 3.0.3 of this SER." However, SER Section 3.0.3 does not review TLAA. TLAA are discussed in SER Section 4.3.

3.4.2.4.7.1 Summary of Technical Information in the Application

The following AMPs are utilized to manage aging effects to the steam cycle sampling system.

- Boric Acid Corrosion Program
- Closed-Cycle Cooling Water System Program

A description of these AMPs is provided in Appendix B of the LRA.

Comment 3.4.2.4.7-1

In Section 3.4.2.4.7.1, the Water Chemistry Program should be added; it is also utilized to manage aging effects for the steam cycle sampling system due to RAI 2.3.2.3-3, which added reference to LRA Table 3.4-2, Item 7.

3.4.2.4.8.1 Summary of Technical Information in the Application

Aging Effects

LRA Tables 3.4-1 and 3.4-2 identify the following applicable aging effects for the feedwater system: ..(continued)

Aging Management Programs

The following AMPs are utilized to manage aging effects to the feedwater system.

- Boric Acid Corrosion Program
- Time-Limited Aging Analysis (10 CFR 54.21(c))
- Water Chemistry Program
- One-Time Inspection Program
- Systems Monitoring Program
- Flow-Accelerated Corrosion Program
- Preventive Maintenance

Comment 3.4.2.4.8-1

This comment is applicable to SER Sections 3.4.2.4.8.1, 3.4.2.4.9.1, 3.4.2.4.9.2, 3.4.2.4.11.1, and 3.4.2.4.11.2. The list of aging effects should include pitting and crevice corrosion for stainless steel components, as indicated in LRA Table 3.4-1, Row 2.

3.4.2.4.10.1 Summary of Technical Information in the Application

Aging Effects

LRA Tables 3.4-1 and 3.4-2 identify the following applicable aging effects for the condensate system:…(continued)

Comment 3.4.2.4.10-1

As indicated on LRA Table 2.3-30, and Table 3.4-2, Row 1, the list of aging effects should include galvanic corrosion for carbon steel components.

3.4.2.4.12.1 Summary of Technical Information in the Application

The AMR results for the circulating water system are presented in Tables 3.4-1 and 3.4-2 of the LRA. The applicant used the GALL Report format to present its AMR of circulating water system components in LRA Table 3.4-1. In LRA Table 3.4-2, the applicant identified the component group designation along with its (1) material, (2) environment, (3) aging effect(s), and (4) AMP(s).

As described in Section 2.3.4.12, the circulating water system provides cooling water from Lake Robinson to the main condensers to condense the steam discharged from the turbine system. Portions of the system provide a flow path for the SWS flow.

<u>Aging Effects</u>

LRA Tables 3.4-1 and 3.4-2 identify the following applicable aging effect for the circulating water system.

- loss of material to general galvanic, pitting, and crevice corrosion, microbiologically induced corrosion, and biofouling of carbon and stainless steel, cast iron, bronze, copper, and aluminum in raw water environment

<u>Aging Management Programs</u>

The following AMP is utilized to manage aging effects to the circulating water system.

- Fire Protection System

A description of this AMP is provided in Appendix B of the LRA.

3.4.2.4.12.2 Technical Evaluation

In addition to Section 3.4 of the LRA, the staff reviewed the pertinent information provided in Section 2.3.4, “Steam and Power Conversion Systems,” and the applicable AMP descriptions provided in Appendix B of the LRA to determine whether the aging effects for the circulating water system components have been properly identified and will be adequately managed during the period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Aging Management Programs</u>

The following AMP is utilized to manage aging effects to the circulating water system.

- Fire Protection System

The above AMP is credited with managing the aging of several components in different structures and systems and is, therefore, considered a common AMP. The staff's review of this common AMPs can be found in Section 3.0.3 of this SER.

After evaluating the applicant's AMR for each of the circulating water system components, the staff evaluated the AMPs listed above to determine if they are appropriate for managing the identified aging effects. For those components identified in Table 3.4-1 of the LRA, the staff verified that the applicant credited the AMP(s) recommended by the GALL Report. For the components identified in Tables 3.4-2, the staff verified that the applicant credited an AMP that is appropriate for the identified aging effect(s).

3.4.2.4.12.3 Conclusions

The staff has reviewed the information in Sections 2.3.4 and 3.4 of the LRA, as well as the applicable AMP descriptions in Appendix B of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the components in the circulating water system will be adequately managed so that these components will perform their intended functions in accordance with the CLB during the period of extended operation.

Comment 3.4.2.4.12-1

Sections 3.4.2.4.12.1 and 3.4.2.4.12.2 should cross-reference LRA Tables 3.3-1 and 3.3-2 instead of 3.4-1 and 3.4-2.

Comment 3.4.2.4.12-2

In the list of AMPs in Sections 3.4.2.4.12.1 and 3.4.2.4.12.2, "Fire Protection System," should be changed to read "Fire Water Program."

Comment 3.4.2.4.12-3

In the first sentence of Sections 3.4.2.4.12.2 and 3.4.2.4.12.3, "3.4" should be "3.3."

3.5.2 Staff Evaluation

Table 3.5-1

Staff Evaluation for RNP Structures and Structural Components Described in the GALL Report

Common Components of All Types of PWR and BWR Containment

Component Group	Aging Effect/ Mechanism	AMP in GALL	Amp in LRA	Staff Evaluation
Penetration sleeves, bellows, and dissimilar metal welds	Cracking due to cyclic loading, or crack initiation and growth due to SCC	Containment ISI and Containment leak rate test	Containment ISI (B.3.14); Containment leak rate test (B.2.7); Water Chemistry Program (B.2.2) and Boric Acid Corrosion Program (B3.2)	Consistent with GALL. GALL recommends further evaluation (See Section 3.5.2.2.1.7 below).
Penetration sleeves, penetration bellows, and dissimilar metal welds	Loss of material due to corrosion	Containment ISI and containment leak rate test	Containment ISI (B.3.14); Containment leak rate test (B.2.7)	Consistent with GALL. (See Section 3.5.2.1 below).
Personnel airlock and equipment hatch	Loss of material due to corrosion	Containment ISI and containment leak rate test	Containment ISI (B.3.14); Containment leak rate test (B.2.7)	Consistent with GALL. (See Section 3.5.2.1 below).
Personnel airlock and equipment hatch	Loss of leak tightness in closed position due to mechanical wear of locks, hinges, and closure mechanism	Containment leak rate test and plant technical specifications	Containment ISI (B.3.14); Containment leak rate test (B.2.7)	Consistent with GALL. (See Section 3.5.2.1 below).
Seals, gaskets, and moisture barriers	Loss of sealant and leakage through containment due to deterioration of joint seals, gaskets, and moisture barriers	Containment ISI and containment leak rate test	Containment ISI (B.3.14); Containment leak rate test (B.2.7)	Consistent with GALL. (See Section 3.5.2.1 below).

Table 3.5-1 (continued)
PWR Concrete (Reinforced and Prestressed) and Steel Containment
BWR Concrete (Mark II and III) and Steel (Mark I, II, and III) Containment

Concrete elements: foundation	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring	Structures Monitoring Program (B.3.15)	Consistent with GALL. (See Section 3.5.2.2.1.1 below).
Concrete elements: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	Structures Monitoring Program (B.3.15)	Consistent with GALL. (See Section 3.5.2.2.1.2. below).
Steel elements: liner plate, containment shell	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Containment ISI (B.3.14); Containment leak rate test (B.2.7)	Consistent with GALL. GALL recommends further evaluation (See Section 3.5.2.2.1.4 below).
Prestressed containment: tendons and anchorage components	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI	Containment ISI (B.3.14)	Consistent with GALL. (See Section 3.5.2.1 below).

Class I Structures

Group 1-3, 5-9: foundation	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring	None	Consistent with GALL. (See Section 3.5.2.2.1.2 below).
Group 1-5: concrete	Reduction of strength and modulus due to elevated temperature	Plant-specific	None	Consistent with GALL. GALL recommends further evaluation (See Section 3.5.3.3.1.3 below).

Comment 3.5.2-1

On Table 3.5-1, “B.3.14” should be “B.3.13” for “Containment ISI” throughout the table.

Comment 3.5.2-2

On Table 3.5-1, Concrete Elements: Foundation - should be 3.5.2.2.2.2 rather than 3.5.2.2.1.1 for Cracks, distortion etc.

Comment 3.5.2-3

On Table 3.5-1, Concrete Elements: Foundation – For Cracks distortions, etc. due to settlement, RNP stated this aging mechanism is not applicable. However, RNP did commit to examination of all accessible concrete per Interim Staff Guidance. However, the AMP used is the IWL Program, not the Structures Monitoring Program.

Comment 3.5.2-4

On Table 3.5-1, Concrete Elements: Foundation – For reduction in foundation strength due to erosion of porous concrete subfoundation, RNP stated this mechanism was not applicable because RNP did not use porous concrete. The table should state "None" or "Not Applicable," for the AMP.

Comment 3.5.2-5

On Table 3.5-1, For "Prestressed containment: tendons and anchorage components," for "loss of material due to corrosion. . .," component group – "AMP in the LRA" should be "None." Staff evaluation should state "Not applicable to RNP."

Comment 3.5.2-6

On Table 3.5-1, For Group 1-5: Concrete – the Staff Evaluation column discusses Section 3.5.3.3.1.3. The correct section numbers are 3.5.2.2.1.3 and 3.5.2.4.2.2.

3.5.2.2.1.2 Cracking, Distortion, and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength due to Erosion of Porous Concrete Subfoundations, If Not Covered by Structures Monitoring Program

<u>3.5.2.2.1.2, Paragraph 2</u>

The applicant addressed the above criteria defined in the GALL Report regarding the need for further evaluation to manage the potential aging of the containment foundation in LRA Table 3.5-1. In row entries 8 and 9 of LRA Table 3.5-1, the applicant stated that it will use its Structures Monitoring Program to manage (1) cracking, and (2) change in material properties as manifested by a reduction in strength for the containment foundation. The staff=s evaluation of the applicant=s Structures Monitoring Program is found in Section B.3.15 of this SER.

Comment 3.5.2.2.1.2-1

RNP LRA Table 3.5-1, Items 8 and 9, did not identify that the Structures Monitoring Program (SMP) will be used to manage cracking and change in material properties, but stated that the aging mechanisms are not applicable to RNP. Since the aging mechanisms were not applicable, no AMP was specified. However, based on the RNP response to Interim Staff Guidance on Concrete Aging in RNP-RA/02-0159, dated

October 23, 2002, RNP did agree to examine accessible containment concrete. This examination includes the aging effect of cracking. However, the AMP used for examining the containment structure concrete is the IWL Program, not the SMP. The section should be revised as noted below:

> "The applicant addressed the above criteria defined in the GALL Report regarding the need for further evaluation to manage the potential aging of the containment foundation in LRA Table 3.5-1. In row entries 8 and 9 of LRA Table 3.5-1, the applicant stated that the aging effects were not applicable. However, based on the applicant's response to Interim Staff Guidance on Concrete Aging (letter to NRC Serial: RNP-RA/02-0159), the applicant stated RNP would examine accessible concrete using the SMP or the IWL Program. For the containment structure, the applicant is using the IWL Program for managing the aging effects of cracking, change in material properties, and loss of material. The staff=s evaluation of the applicant=s IWL Program is found in Section B.3.14 of this SER.
>
> Regarding the aging effect, cracking due to settlement, the applicant stated the following in row 8 of the LRA Table 3.5-1:
>
> "The RNP AMR determined that cracking due to settlement is not applicable. Monitoring for settlement was performed during construction of the plant. Based on the results of the monitoring program and 30 years of operating experience, settlement is not an applicable aging mechanism and no dewatering system was used at RNP." Refer to Table 3.5-1 of this SER.
>
> Regarding the reduction in strength due to erosion of porous concrete subfoundation, the applicant stated the following in row 9 of the LRA Table 3.5-1:
>
> "The RNP AMR for concrete determined that RNP concrete foundations are not constructed of porous concrete and, therefore, are not susceptible to this aging mechanism." Refer to Table 3.5-1 of this SER. Table 3.5-1 lists "none" for the AMP for this effect because porous concrete does not exist at RNP."

3.5.2.2.1.3 Reduction of Strength and Modulus of Concrete Structures Due to Elevated Temperature

<u>3.5.2.2.1.3, Paragraph 4</u>

Generally, RNP concrete elements do not experience temperatures that exceed the temperature limits associated with aging degradation due to elevated temperature. During an accident, uninsulated concrete may experience a temperature greater than 200°F for less than 10 seconds, but this was considered to have minimal effects. Therefore, this aging effect is not applicable. However, a TLAA was evaluated to demonstrate the continuing capability of one containment penetration when subject to temperature cycles that exceed 200°F in adjacent concrete.

Comment 3.5.2.2.1.3-1

RNP determined the concrete temperature surrounding the subject containment penetration did not exceed 200 °F. The TLAA for this was therefore eliminated by Confirmatory Item 4.6.3-1. Proposed alternate wording for this section is as follows.

“RNP concrete elements do not experience temperatures that exceed the temperature limits associated with aging degradation due to elevated temperature. Therefore, this aging effect is not applicable.”

3.5.2.2.1.4 Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate

3.5.2.2.1.4, Paragraph 7

A section of the liner was examined (approximately 1 foot deep by 4 feet long in a pre-existing void) below the concrete floor at the 228 foot elevation. A visual examination determined there were tightly adhered corrosion products on the liner surface. A UT examination for actual liner plate thickness determined there was no loss of material thickness. Water samples located in this void area were alkaline, stagnant, low re-oxygenation, low chloride concentration, and low boron concentration. The vertical liner below the concrete floor was in better condition and less pitted than the liner surface immediately above the concrete floor. The liner surface immediately above the concrete floor had pitting corrosion up to 0.1875 inch which was the worst case. This corrosion rate was estimated based on the worst-case degradation occurring from the containment flooding event in 1975 to the liner inspections in 1988 (0.1875 inch/13 years). The corrosion rate was then applied to the difference between the actual thickness examined for the liner and minimum design thickness. The worst-case corrosion area above the concrete was determined to conservatively meet the liner design thickness until year 2005. The liner plate thickness below the concrete, which had no degradation, was determined to be acceptable (exceeding the minimum wall thickness) for continued service until 2005. By 2005, either further evaluation or inspection will be required for the inaccessible portion of the liner below the concrete.

Comment 3.5.2.2.1.4-1

In Section 3.5.2.2.1.4, paragraph 7, sixth sentence, “1988” should have been shown as “1998,” and “13 years” should be “23 years.”

3.5.2.2.1.6 Cumulative Fatigue Damage

As stated in the SRP-LR, the GALL Report identifies cumulative fatigue damage as a TLAA for penetration sleeves, penetration bellows, and dissimilar metal welds to be performed for the period of extended operation. The applicant covered this TLAA in Section 4.6 of the application and the staff evaluation of this TLAA is addressed in Section 4.6 of this SER.

On the basis of the staff's review of LRA Section 4.6, the staff concludes that the structures and structural components subject to fatigue will be adequately managed during the period of extended operation.

Comment 3.5.2.2.1.6-1

This should refer to LRA Section 4.3.5, and "structures and structural components" replaced with "containment penetration bellows."

3.5.2.2.1.7 Cracking Due to Cyclic Loading and SCC

3.5.2.2.1.7, Paragraph 2

Items 2 and 3 of Table 3.5-1 of the LRA discuss the plant-specific operating experience related to cracking due to SCC and/or cyclic loading, as well as loss of material of the penetration sleeves and bellows. In addition to its Containment Inservice Inspection and Containment Leak Rate Testing AMPs, the applicant uses its Water Chemistry Program to identify degradation of stainless steel components, and its Boric Acid Corrosion Program if the corrosion is caused by leakage of borated water on carbon steel components. To better understand the plant-specific operating experience related to the degradation of penetration bellows, the staff requested additional information in RAIs 3.5.1-16 and 3.5.1-17.

Comment 3.5.2.2.1.7-1

It is recommended that the second sentence in paragraph 2 be revised to state the following:

> "In addition to its Containment Inservice Inspection and Containment Leak Rate Testing AMPs, the applicant uses its Water Chemistry Program to identify degradation of stainless steel components which are subjected to borated, treated water, and its Boric Acid Corrosion Program if the corrosion is caused by leakage of borated water on carbon steel components."

3.5.2.3 Aging Management Programs for Containment, Structures, and Component Supports

3.5.2.3, Paragraph 2

The applicant credits 10 AMPs to manage the aging effects associated with the containment, other Class I structures, and component supports. Four of the AMPs are credited to manage aging for components in other system groups (common AMPs), while six AMPs are credited with managing aging only for structural components. The staff's evaluation of the common AMPs credited with managing aging in structures is provided in Section 3.0.3 of this SER. The common AMPs include the following programs.:

- Metal Fatigue of Reactor Coolant Pressure Boundary (Fatigue Monitoring Program) (SER Section 3.0.3.1)
- Water Chemistry Program (SER Section 3.0.3.3)
- Boric Acid Corrosion Program (SER Section 3.0.3.4)
- One-Time Inspection Progrm (SER Section 3.0.3.9)
- Bolting Integrity Program (SER Section 3.0.3.6)

Comment 3.5.2.3.1-1

RNP credits 13 AMPs to manage the aging effects associated with the containment, other Class I structures, and component supports. Four of the AMPs are credited to manage aging for components in other system groups (common AMPs), six AMPs are credited with managing aging only for structural components, and three are evaluated as mechanical systems. The staff=s evaluation of the common AMPs credited with managing aging in structures is provided in Section 3.0.3. The AMPs evaluated as mechanical systems include:

- Fire Water System Program (3.3.2.3.3)
- Fire Protection Program (3.3.2.3.2)
- Inspection of Overhead Heavy-Load and Light-Load Handling Systems Program (3.3.2.3.1)

The common AMPs include the following programs:

Two of the common AMPs listed are not credited with structural component by RNP. Please revise the list as indicated below, including the addition of the Preventive Maintenance Program.

- Water Chemistry Program (SER Section 3.0.3.3)
- Boric Acid Corrosion Program (SER Section 3.0.3.4)
- One-Time Inspection Progrm (SER Section 3.0.3.9)
- Preventive Maintenance Program (SER Section 3.0.3.12)

3.5.2.3.1.2 Staff Evaluation

<u>3.5.2.3.1.2, Paragraph 8</u>

The staff reviewed this response in conjunction with the applicable relief request and the responses provided to RAIs 3.5.1-17 and 3.5.1-19. Based on these reviews, the staff determined that (1) during the 2005 outage, the applicant will perform a focused inspection of the liner plate behind the moisture barrier and the insulation at the junction of the wall and the concrete at elevation 228 ft., (2) the applicant will perform the periodic examination of these areas as required by 10 CFR 50.55a and Subsection IWE, and (3) as a result of the 2005 inspection, if additional inspections are required, the applicant will determine the time and schedule of the additional examinations. Based on this

determination, the staff finds the mechanism used by the applicant to monitor these areas acceptable.

Comment 3.5.2.3.1.2-1

To assure accuracy, it is recommended that the section be revised to read:

"The staff reviewed this response in conjunction with the applicable relief request and the responses provided to RAIs 3.5.1-7 and 3.5.1-19. Based on these reviews, the staff determined that (1) by 2005, the applicant will perform a focused inspection of the liner plate behind the moisture barrier and the insulation at the junction of the wall and the concrete at elevation 228 ft., (2) the applicant will perform the periodic examination of these areas as required by 10 CFR 50.55a and Subsection IWE, and (3) as a result of the inspection performed by 2005, if additional inspections are required, the applicant will determine the time and schedule of the additional examinations. Based on this determination, the staff finds the mechanism used by the applicant to monitor these areas acceptable."

3.5.2.3.2.2 Staff Evaluation

<u>3.5.2.3.2.2, Paragraph 22</u>

Additionally, the applicant asserts that the concrete at the RHR penetration meets the design requirements as discussed in the RNP response to RAI 4.6.3-2. The staff reviewed the above in conjunction with the applicant=s response to RAI 4.6.3-2. The Code requirements pertinent to the temperatures in concrete are those contained in Subparagraph CC-3440 of Section III, Division 2 of the ASME Code. The requirements permit sustained temperatures up to 200 °F for the concrete around penetrations. The discussion in the applicant=s responses indicate that (1) the maximum temperatures around RHR penetration will be 208 °F, for 10 hours during the cooldowns, and 22 hours during heatup transients, and (2) the sustained temperatures in the concrete around the penetration will be 162 °F. Under this type of temperature conditions, the staff believes that the applicant=s evaluation related to the concrete compressive strength provided in response to RAI 4.6.3-2 is conservative. The surface inspections performed of the concrete around the penetration did not indicate evidences of inservice degradation. As the applicant will be performing IWL inspections during the extended period of operation, the staff considers the applicant=s evaluation of the concrete around the RHR penetration acceptable.

Comment 3.5.2.3.2.2-1

The second part of the fifth sentence should be deleted, i.e., "and (2) the sustained temperatures in the concrete around the penetration will be 162 °F." RNP cannot find a source to validate 162°F. Reference is made to RNP letter RNP-RA/03-0094, dated August 14, 2003, which includes the RNP response to Confirmatory Item 4.6.3-1. This item states that concrete temperature will always remain below 200°F around the containment penetration. The TLAA for Elimination of Containment Penetration Coolers was withdrawn.

3.5.2.3.5.2 Staff Evaluation

In LRA Section B.1.15, AStructures Monitoring Program,@ the applicant described its program to manage the aging of civil SCs within the scope of license renewal. The LRA states that this program is consistent with GALL Program XI.S6, AStructures Monitoring Program.@ The staff confirmed the applicant=s claim of consistency during the AMR inspection. In addition, the staff determined whether the applicant properly applied the GALL program to its facility. The staff also reviewed the UFSAR Supplement to determine whether it provides an adequate description of the program.

Comment 3.5.2.3.5.2-1

The first sentence should be corrected to refer to LRA Section “B.3.15,” not “B.1.15.”

<u>3.5.2.3.5.2, Paragraph 4 and 5</u>

For concrete SCs outside of containment, the applicant stated that it will use the Structures Monitoring Program to manage loss of material and change in material properties. However, the applicant did not indicate that it would manage cracking as specified in the GALL Report. In addition, for several of the table entries in LRA Table 3.5-1, the applicant stated that the aging effect/mechanism combinations identified in the GALL Report are not applicable to RNP. The staff requested, in RAIs 3.5.1-3, 3.5.1-9, and 3.5.1-11, that the applicant clarify its intent to manage the aging effect/mechanism combinations as recommended by the GALL Report. In response, the applicant stated that although it does not consider these aging effects to be applicable, it will manage the aging of concrete structures at RNP as recommended by the GALL Report. As the applicant has committed to manage the aging of accessible concrete structural components at RNP, including cracking, the staff considers the response to the RAIs adequate.

The staff requested additional information regarding the aging management of elastomers. By letter dated April 28, 2003, the applicant stated, @The [Structures Monitoring Program] manages aging of the seismic joint filler commodity by visual inspection to note any indication of movement or distress, as well as a determination that the gaps meet design requirements and are free of debris. The [Structures Monitoring Program] manages aging of roof material by a visual inspection for degradation, damage, and/or leakage.@ The staff finds that this consistent is with GALL and acceptable.

Comment 3.5.2.3.5.2-2

The fourth paragraph should be revised to remove reference to RAI 3.5.1-9 and add RAI 3.5.1-8. RAI 3.5.1-9 discusses the IWL Program. RAI 3.5.1-8 discusses the Structures Monitoring Program (SMP).

Comment 3.5.2.3.5.2-3

Please revise the first sentence in the fifth paragraph to refer to a specific RAI number, i.e., RAI B.3.15-2.

3.5.2.3.6.1 Summary of Technical Information in the Application

3.5.2.3.6.1, Paragraph 5

Earthen structures aging effects and mechanisms:

$ loss of form due to settlement
$ cracking due to elevated temperature

Comment 3.5.2.3.6.1-1

Please delete "cracking due to elevated temperature" from earthen structures aging effects and mechanisms, since this is not an applicable aging effect for RNP.

3.5.2.3.6.2 Staff Evaluation

3.5.2.3.6.2, Paragraph 5

Detection of Aging Effects: The LRA states that the method of identifying aging effects is based on an independent inspection using the ARecommended Guidelines for Safety Inspection of Dams.@ The detection of aging effects uses a combination of visual field inspection and office review of available data: records and operating history and any actual or potential deficiencies, whether in the condition of the project works, the quality and adequacy of project maintenance, surveillance, or in the methods of operation. The dam inspections are conducted at five year intervals. The staff finds that this is consistent with the FERC program and, therefore, acceptable.

Monitoring and Trending: The LRA states that the dam inspections are conducted at five year intervals. The LRA further states that the ARecommended Guidelines for Safety Inspection of Dams,@ Phase I, Appendix 1, investigation report instructs the user to review the Ahistory of previous failures or deficiencies and pending remedial measures for correcting known deficiencies and the schedule for accomplishing remedial measures should be indicated...,@ and recommends a review of inspection history, including the results of the last safety inspection. The staff finds that the overall monitoring and trending techniques proposed by the applicant are acceptable because inspections and review of inspection history, including the results of the last safety inspection activities, will effectively manage the applicable aging effects.

Comment 3.5.2.3.6.2-1

The second sentence in Detection of Aging Effects should be revised to clearly state the intent of LRA B.3.16. Proposed alternate wording is provided as follows:

“The detection of aging effects uses a combination of visual field inspection and office review of available data, records and operating history, to detect any actual or potential deficiencies, whether in the condition of the project works, the quality and adequacy of project maintenance, surveillance, or in the methods of operation.”

Comment 3.5.2.3.6.2-2

The second sentence of Monitoring and Trending should be revised to match LRA Section B.3.16.

> “The LRA states that the dam inspections are conducted at five year intervals. The LRA further states that the ARecommended Guidelines for Safety Inspection of Dams,@ Phase I, Appendix I, investigation report instructs the user to review the Ahistory of previous failures or deficiencies and pending remedial measures for correcting known deficiencies and the schedule for accomplishing remedial measures should be indicated.”

3.5.2.4.1.1 Summary of Technical Information in the Application

<u>3.5.2.4.1.1, Paragraph 2</u>

As described in Section 2.4.1.1 of the LRA, the containment structure is a steel-lined concrete shell in the form of a vertical right circular cylinder with a hemispherical dome and a flat base. The containment encloses the reactor and major components of the RCS and other important systems that interface with the RCS. Also, the containment houses and supports components required for reactor refueling. These include the polar crane, refueling cavity, and portions of the fuel handling system.

The materials of construction for the containment structure, as discussed in Section 2.4.1 of the LRA, are concrete, steel, and miscellaneous materials such as containment liner insulation and elastomers. These materials are exposed to containment air, outdoor air, borated water, and a buried environment.

<u>Aging Effects</u>

The LRA identifies the following aging effects for the containment structure.

- **$** cracking, loss of material, and change in material properties for concrete components
- **$** cracking and loss of material for penetration sleeves, bellows, and other steel components
- **$** cumulative fatigue, cracking, and loss of material for steel containment penetrations

- loss of material for carbon steel structural components
- loss of material and loss of prestress for containment tendons
- loss of seal for elastomers

Aging Management Programs

The LRA credits the following AMPs with managing the identified aging effects for the containment structure.

- ASME Section XI, Subsection IWL Program
- ASME Section XI, Subsection IWE Program
- 10 CFR Part 50, Appendix J Program
- Structures Monitoring Program
- Boric Acid Corrosion Program
- One-Time Inspection Program

A description of these AMPs is provided in Appendix B of the LRA.

Comment 3.5.2.4.1.1-1

The second paragraph should be revised to add the exterior structure around the personnel and equipment hatches, and explain where the interior components are discussed. The following is suggested:

> "As described in Section 2.4.1.1 of the LRA, the containment structure is a steel-lined concrete shell in the form of a vertical right circular cylinder with a hemispherical dome and a flat base. The containment includes the protective concrete structure outside the containment around the personnel and equipment hatch areas. The containment encloses the reactor and major components of the RCS and other important systems that interface with the RCS. Also, the containment houses and supports components required for reactor refueling. These include the polar crane, refueling cavity, and portions of the fuel handling system, which are included with components on the interior of the containment structure."

Comment 3.5.2.4.1.1-2

The LRA identifies the following aging effects for the containment structure. The SER should reflect this.

- cracking, loss of material, and change in material properties for concrete components
- cracking and loss of material for stainless steel penetration sleeves, bellows, and other stainless steel components
- cumulative fatigue for penetration bellows (TLAA)
- loss of material for carbon steel components
- loss of prestress for containment tendons (TLAA)
- change in material properties and cracking for elastomers (results in loss of seal)

Comment 3.5.2.4.1.1-3

The AMPs listed in 3.5.2.4.1.1 should be revised to include the IWF Program and the Water Chemistry Program. Two additional programs are credited with components in the Containment Structure, but these are discussed in other portions of the SER. This includes the Inspection of Overhead Heavy Load and Light Load Handling Systems Program, and the Fire Water System, and these should also be included in the list of credited AMPs.

3.5.2.4.1.2 Staff Evaluation

<u>Aging Effects</u>

Concrete: For containment concrete components, the applicant=s AMR is consistent with the recommendations in the GALL Report. As such, the applicant has committed to manage cracking, change in material properties, and loss of material for containment concrete components that are accessible. However, for several of the table entries in LRA Table 3.5-1, the applicant stated that the aging effect/mechanism combinations identified in the GALL Report are not applicable to RNP. In RAIs 3.5.1-8, 3.5.1-11, and 3.5.1-14, the staff requested that the applicant clarify its intentions to manage the aging effect/mechanism combinations for concrete SCs as recommended by the GALL Report. In its response to these RAIs, the applicant stated that it has A...committed to an AMP for monitoring accessible concrete based on Interim Staff Guidance.@ The staff position concerning the aging management of concrete SCs, which is discussed in an Interim Staff Guidance paper for concrete, is that concrete SCs need to be periodically inspected in order to adequately monitor their performance or condition in a manner that allows for the timely identification and correction of degraded conditions. In addition, in response to RAI 3.5.1-8, the applicant stated that Item 10 in LRA Table 3.5-2 will be deleted. Item 10 states that reinforced concrete, the concrete sump, tank foundation, and electrical manhole, which are concrete/grout components located in the containment, do not have any applicable aging effects. Because the applicant has committed to monitor accessible containment concrete/grout components for cracking, loss of material, and change in material properties using the appropriate AMPs, the staff considers the applicant=s response to be adequate. As such, the staff considers RAIs 3.5.1-8, 3.5.1-11, and 3.5.1-14 closed.

Comment 3.5.2.4.1.2-1

The Aging Effects for Concrete should be revised to accurately reflect the LRA.

Specifically, in middle of the first paragraph, please revise the eighth sentence to read as follows:

“In addition, in response to RAI 3.5.1-8, the applicant stated that Item 10 in LRA Table 3.5-2 will be deleted. Item 10, which includes accessible concrete/grout components

located in the containment, states that concrete and grout would experience no aging effects."

3.5.2.4.1.2, Aging Effects, *Concrete*, Paragraph 3

For below-grade containment concrete components, the GALL Report recommends aging management only for an aggressive below-grade soil/ground water environment. Since ASME Section XI, Subsection IWL exempts from examination those portions of the concrete containment that are inaccessible, the GALL Report recommends that a plant-specific AMP be developed for concrete that may be exposed to an aggressive below-grade soil/ground water environment. As stated previously in SER Sections 3.5.2.2.1.1 and 3.5.2.2.2.2, the low pH value (< 5.5) for the ground water at RNP suggests a potentially aggressive environment for below-grade concrete. Therefore, a plant-specific AMP, or special provisions to an existing AMP for below-grade concrete components, is warranted. As described previously in Section 3.5.2.2.1.1 of this SER, the applicant has committed to use its periodic underwater inspections at the Intake Structure and RNP Dam Spillway as a leading indicator for potential degradation to below-grade concrete structures. Both these structures are exposed to lake water, which has similar pH, chloride, and sulfate values as the ground water at RNP. In the event that significant degradation to the submerged portions of the Intake Structure or Dam Spillway is observed, the applicant will evaluate and examine below-grade concrete through both the ASME Section XI, Subsection IWL (for containment) and Structures Monitoring Program (for other Class I structures) AMPs.

Comment 3.5.2.4.1.2-2

Please revise the last sentence of the paragraph to read as follows to reflect the latest commitments by RNP (reference RNP-RA/03-0094, dated August 14, 2003, Confirmatory Item 3.5-1):

> "In the event that significant degradation to the submerged portions of the Intake Structure or Dam Spillway is observed, or ground water and lake water trending results indicate increasing aggressiveness, the applicant will evaluate and examine below-grade concrete through both the ASME Section XI, Subsection IWL (for containment) and Structures Monitoring Program (for other Class I structures) AMPs. The applicant's commitment to provide appropriate documentation of the above agreement is designated as Confirmatory Item 3.5-1."

3.5.2.4.1.2, Aging Effects

Steel: Consistent with the GALL Report recommendations, the applicant identified loss of material for containment carbon steel structural components, and cumulative fatigue, cracking, and loss of material as applicable aging effects for steel containment penetrations. In addition, loss of leak tightness in the closed position is identified as an aging effect for the containment equipment hatch and the personnel airlock. Loss of

prestress for containment tendons is also identified as an applicable aging effect by the applicant.

Loss of material due to corrosion of the embedded containment liner and cracking of containment penetrations due to cyclic loading are identified by the GALL Report as aging effects requiring further evaluation and are covered in detail in Sections 3.5.2.2.1.4 and 3.5.2.2.1.7, respectively, of this SER. Loss of prestress for containment tendons is evaluated as a TLAA and reviewed by the staff in Section 4.5 of this SER.

Comment 3.5.2.4.1.2-3

Please revise the discussion of Steel as follows to more accurately reflect the LRA, Table 3.5-1, Item 5, and Section 4.3.5.

> "*Steel*: Consistent with the GALL Report recommendations, the applicant identified loss of material for containment carbon steel components; cracking and loss of material as applicable aging effects for stainless steel components. In addition, loss of leak tightness in the closed position is identified as an aging effect for the containment equipment hatch and the personnel airlock. The applicant identifies this as loss of material due to wear. Loss of prestress for containment tendons is also identified as an applicable aging effect by the applicant.
>
> Loss of material due to corrosion of the embedded containment liner and cracking of containment penetrations due to cyclic loading are identified by the GALL Report as aging effects requiring further evaluation and are covered in detail in Sections 3.5.2.2.1.4 and 3.5.2.2.1.7, respectively, of this SER. Loss of prestress for containment tendons is evaluated as a TLAA and reviewed by the staff in Section 4.5 of this SER. Fatigue damage is evaluated as a TLAA in Section 4.3.5 of this SER."

3.5.2.4.1.2, Aging Effects

Elastomers (moisture barriers, seals): Consistent with the GALL Report recommendations, the applicant identified loss of seal as an applicable aging effect for the containment moisture barrier and seals/gaskets.

Comment 3.5.2.4.1.2-4

Please revise the discussion of Elastomers as follows to more accurately reflect LRA Table 3.5-1, Item 6, and Section B.3.13:

> "*Elastomers (moisture barriers, seals)*: Consistent with the GALL Report recommendations, the applicant identified loss of seal as an applicable aging effect for the containment moisture barrier and seals/gaskets. The aging effects identified by the applicant are change in material properties and cracking of elastomers. These aging effects are considered to result in loss of seal."

3.5.2.4.1.2, Aging Management Programs

Tables 3.5-1 and 3.5-2 of the LRA credit the following AMPs with managing the identified aging effects for the components in the containment.

- ASME Section XI, Subsection IWL Program
- ASME Section XI, Subsection IWE Program
- ASME Section XI, Subsection IWF Program
- 10 CFR Part 50, Appendix J Program
- Structures Monitoring Program
- Boric Acid Corrosion Program
- One-Time Inspection Program
- Water Chemistry Program

The Boric Acid Corrosion Program, Water Chemistry Program, and One-Time Inspection Program are credited with managing the aging of several components in several different structures and systems and are, therefore, considered common AMPs. The staff's review of these common AMPs can be found in Section 3.0.3 of this SER. The staff's evaluation of the noncommon, or structure-specific, AMPs, listed above, is presented in Section 3.5.2.3 of this SER.

Comment 3.5.2.4.1.2-5

Please revise the discussion under Aging Management Programs as follows to more accurately reflect the LRA:

> "Aging Management Programs
>
> Tables 3.5-1 and 3.5-2 of the LRA credit the following AMPs with managing the identified aging effects for the containment components.
>
> - ASME Section XI, Subsection IWL Program
> - ASME Section XI, Subsection IWE Program
> - ASME Section XI, Subsection IWF Program
> - Structures Monitoring Program
> - Boric Acid Corrosion Program
> - One-Time Inspection Program
> - 10 CFR Part 50, Appendix J Program
> - Water Chemistry Program
>
> The Boric Acid Corrosion Program, Water Chemistry Program, and One-Time Inspection Program are credited with managing the aging of several components in several different structures and systems and are, therefore, considered common AMPs. The staff's review of these common AMPs can be found in Section 3.0.3 of this SER. The staff's evaluation of the noncommon, or structure-specific, AMPs, listed above, is presented in Section 3.5.2.3 of this SER. Two additional AMPs manage aging effects for containment components, but are not identified in Tables 3.5-1 or Table 3.5-2. The Inspection of Overhead

> Heavy Load and Light Load Handling Systems Program is reviewed in Section 3.3.2.3.1 of this SER. The Fire Water System Program is reviewed in Section 3.3.2.3.3 of this SER."

3.5.2.4.1.3 Conclusions

The staff has reviewed the information in Sections 2.4 and 3.5 of the LRA, the applicant=s responses to the staff=s RAIs, and the applicable AMP descriptions in Appendix B of the LRA. On the basis of this review, the staff concludes that the applicant has demonstrated that the aging effects associated with the components in the containment will be adequately managed so that these components will perform their intended functions in accordance with the CLB during the period of extended operation.

Comment 3.5.2.4.1.3-1

Please change the second sentence to more clearly indicate that the conclusions apply to all containment components, not just those in the containment, e.g., replace "components in the containment" with "containment components."

3.5.2.4.2.1 Summary of Technical Information in the Application

The AMR results for other structures are presented in Tables 3.5-1 and 3.5-2 of the LRA. The applicant used the GALL Report format to present its AMR of structural components in LRA Table 3.5-1. In LRA Table 3.5-2, the applicant identified the component group designation along with its (1) material, (2) environment, (3) aging effect(s), and (4) AMP(s). The structural components listed in Tables 3.5-1 and 3.5-2 of the LRA are in the following structures.

$ Reactor Auxiliary Building
$ Fuel Handling Building
$ Turbine Building
$ Dedicated Shutdown Diesel Generator Building
$ Radwaste Building
$ Intake Structure
$ North Service Water Header Enclosure
$ Emergency Operations Facility/Technical Support Center Security Emergency Diesel Generator Building
$ Discharge Structures
$ Lake Robinson Dam
$ Pipe Restraint Tower
$ Yard Structures and Foundations
$ Refueling System

A brief description of each of the above structures is provided in Section 2.4.2, AOther Structures,@ of the LRA. The materials of construction identified in the LRA for each of the above structures are (1) steel, (2) concrete, (3) aluminum, (4) elastomers, and (5) miscellaneous material, such as soil and ceiling and floor tiles. These materials are

exposed to outdoor, buried, indoor-not-air-conditioned, borated water, and raw water environments.

Aging Effects

Tables 3.5-1 and 3.5-2 of the LRA identify the following applicable aging effects for components in structures outside the containment.

- loss of material
- change in material properties
- cracking
- loss of seal or leak tightness
- loss of mechanical function
- loss of form
- corrosion of embedded steel
- reduction in strength
- reduction in concrete anchor capacity
- cracking of masonry walls

Aging Management Programs

Tables 3.5-1 and 3.5-2 of the LRA credit the following AMPs with managing the identified aging effects for the components in structures outside the containment.

- ASME Section XI, Subsection IWF Program
- Boric Acid Corrosion Program
- Metal Fatigue of Reactor Coolant Pressure Boundary (Fatigue Monitoring Program)
- Dam Inspection Program
- Structures Monitoring Program
- Water Chemistry Program

A description of these AMPs is provided in Appendix B of the LRA.

Comment 3.5.2.4.2.1-1

For the first and second paragraphs of Section 3.5.2.4.2.1, please delete Discharge Structures and Refueling System, and modify the environments to add the indoor-air conditioned environment. Discharge Structure components were screened out of scope and Refueling System components are included in the Containment Structure and the Fuel Handling Building.

Comment 3.5.2.4.2.1-2

Please revise the Aging Effects to more accurately reflect the LRA. For components in structures outside the containment structure, loss of seal or leak tightness for elastomers was determined to be the same as cracking and change in material properties of elastomers. In addition, reduction in strength was determined to be not applicable because RNP did not use porous concrete and concrete is not exposed to elevated

temperatures as discussed in Table 3.5-1, Items 22 and 23. Therefore, please remove "loss of seal or leak tightness" and "reduction in strength," and insert "change in material properties and cracking of elastomers" in the bulleted list of Aging Effects.

Comment 3.5.2.4.2.1-3

Please delete the Metal Fatigue of Reactor Coolant Pressure Boundary (Fatigue Monitoring Program) from the bulleted list of Aging Management Programs, because it does not apply outside the containment.

3.5.2.4.2.2 Staff Evaluation

Aging Effects

Concrete: For concrete components in structures outside the containment, the applicant=s AMR is consistent with the recommendations in the GALL Report. As such, the applicant has committed to manage cracking, change in material properties, and loss of material for concrete structural components that are accessible. As stated previously in Section 3.5.2.4.1.2 of this SER, several of the table entries in LRA Table 3.5-1 stated that the aging effect/mechanism combinations identified in the GALL Report are not applicable to RNP. The staff requested, in RAIs 3.5.1-3, 3.5.1-9, and 3.5.1-11, that the applicant clarify its intent to manage the aging effect/mechanism combinations as recommended by the GALL Report. In response, the applicant stated that although it does not consider these aging effects to be applicable, it will manage the aging of concrete structures at RNP as recommended by the GALL Report. As the applicant committed to manage the aging of accessible concrete structural components at RNP, the staff considers the response to the RAIs adequate.

<u>Aging Management Programs</u>

Tables 3.5-1and 3.5-2 of the LRA credit the following AMPs with managing the identified aging effects for the components in structures outside the containment.

$ ASME Section XI, Subsection IWF Program
$ Boric Acid Corrosion Program
$ Metal Fatigue of Reactor Coolant Pressure Boundary (Fatigue Monitoring Program)
$ Dam Inspection Program
$ Structures Monitoring Program
$ Water Chemistry Program

The applicant credits the above listed AMPs to manage the aging effects associated with structures and structural components outside the containment. Three of the AMPs (i.e., Fatigue Monitoring Program, Water Chemistry Program, and Boric Acid Corrosion Program) are credited to manage aging for components in other system groups (common AMPs), while the remaining three AMPs are credited with managing aging only for structures and structural components outside the containment. The staff=s evaluation

of the common AMPs credited with managing aging in structures and structural components outside the containment is provided in Section 3.0.3 of this SER.

Comment 3.5.2.4.2.2-1

In the discussion of Aging Effects in Section 3.5.2.4.2.2, please revise the list of RAIs in the first paragraph for concrete aging effects to replace RAIs 3.5.1-3, 3.5.1-9, and 3.5.1-11 with 3.5.1-8 and 3.5.1-10. RAI 3.5.1-3, 3.5.1-9, and 3.5.1-11 were based on IWL Program concrete. RAIs 3.5-1-8 and 3.5.1-10 discuss the Structures Monitoring Program.

Comment 3.5.2.4.2.2-2

In the discussion of Aging Management Programs in Section 3.5.2.4.2.2, the structures outside the containment utilize AMPs that are not listed. These are not referenced in LRA Tables 3.5-1 and 3.5-2, but are civil/structural components. These programs, listed below, should be referenced in the discussion. Also, aging of structures outside the containment is not managed by the Fatigue Monitoring Program, so this AMP should be deleted from the list. Please revise the discussion following the list to note that two AMPs (Water Chemistry and Boric Acid Corrosion) are common AMPs. In addition, add the following to the discussion:

> "Other structural components are managed by additional AMPs. These AMPs and the location where the staff evaluated these AMPs are listed below:
>
> $ Fire Water System Program (3.3.2.3.3)
> $ Fire Protection System Program (3.3.2.3.2)
> $ Preventive Maintenance Program (3.0.3.12)
> $ Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program (3.3.2.3.1)"

3.5.2.4.3.1 Summary of Technical Information in the Application

<u>3.5.2.4.3.1, Paragraph 2</u>

Component supports are those components that provide support or enclosure for mechanical and electrical equipment. The component supports identified in LRA Section 2.4 include (1) anchorages/embedments, (2) electrical component supports, (3) expansion anchors, (4) instrument line supports, (5) instrument racks and frames, (6) pipe supports, (7) pressurizer surge line supports, (8) SG supports, (9) vibration isolators, (10) battery racks, (11) HVAC duct supports, and (12) tube track supports.

The materials of construction for the component supports, which are subject to an AMR, are steel, aluminum, and copper alloy. These materials are exposed to internal, external, borated water leaks, and embedded environments.

Comment 3.5.2.4.3.1-1

The staff did not include other important component supports that the LRA listed in Tables 2.4-1 through 2.4-12. If the intent is to include all component supports, then the list should be modified to include (1) pressurizer supports, (2) cable tray and conduit, (3) electrical bus duct, (4) equipment supports, (5) pipe whip restraints, (6) reactor coolant pump supports , (7) reactor vessel supports, (8) slide bearing plates, and (9) threaded fasteners.

Comment 3.5.2.4.3.1-2

The sentence regarding materials of construction should be revised to remove discussion of aluminum component supports. Aluminum was used for siding, protective enclosures, louvers, and as a member of the Spent Fuel Pool Bridge crane, but not for component supports. LRA Table 3.5-2, Item 5, lists aluminum as a material, but only for the enclosures, louvers, and siding.

<u>3.5.2.4.3.1, Aging Management Programs</u>

<u>Aging Management Programs</u>

Tables 3.5-1 and 3.5-2 of the LRA credit the following AMPs with managing the identified aging effects for the component supports.

$ Boric Acid Corrosion Program
$ Structures Monitoring Program
$ ASME Section XI, Subsection IWF Program
$ Bolting Integrity Program
$ One-Time Inspection Program

Comment 3.5.2.4.3.1-3

The list of Aging Management Programs should not include the Bolting Integrity Program and the One-Time Inspection Program because they are not applicable. LRA Table 3.5-1, Item 29, states that SCC is not applicable, and therefore the Bolting Integrity Program is not applicable to the structural bolts. LRA Table 3.5-1, Items 25 through 29, do not refer to the One Time Inspection Program. This program only applies to the containment liner.

3.5.2.4.3.2 Staff Evaluation

<u>Aging Effects</u>

Aluminum: For the aluminum component supports either in an indoor-not-air-conditioned and outdoor environment, the applicant identified loss of material as an applicable aging effect.

Copper Alloy: For the copper alloy slide bearing plate inside containment, the applicant did not identify any applicable aging effects. The staff's review of these slide bearing plates is provided in Section 3.5.2.4.1.2 of this SER.

On the basis of its review, the staff finds that the applicant has identified the appropriate aging effects for the materials and environments associated with component supports.

Aging Management Programs

Tables 3.5-1 and 3.5-2 of the LRA credit the following AMPs with managing the identified aging effects for the component supports.

- Boric Acid Corrosion Program
- Structures Monitoring Program
- ASME Section XI, Subsection IWF Program
- Bolting Integrity Program
- One-Time Inspection Program

Comment 3.5.2.4.3.2-1

In the discussion of Aging Effects, the discussion of aluminum should be deleted based on comments provided in Section 3.5.2.4.3.1.

Comment 3.5.2.4.3.2-2

In the discussion of Aging Management Programs, the list of Aging Management Programs should have the Bolting Integrity Program and the One-Time Inspection Program deleted based on comments in Section 3.5.2.4.3.1.

3.6.1 Summary of Technical Information in the Application

In LRA Section 3.6, the applicant described its AMRs for the electrical and I&C systems group at RNP. The description of the electrical and I&C systems can be found in LRA Section 2.5.

Comment 3.6.1-1

Section 2.5 of the LRA provides information related to the scoping and screening process for electrical and I&C systems; however, the systems themselves are not described. Therefore, it is recommended that the first paragraph of Section 3.6.1 be revised to focus on scoping and screening, rather than on system descriptions. This comment also applies to paragraph three of Section 3.6.2.

3.6.2 Staff Evaluation

3.6.2, Paragraph 4

Table 3.6-1 below provides a summary of the staff=s evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.6 that are addressed in the GALL Report.

Table 3.6-1

Staff Evaluation Table for RNP Electrical Components Evaluated in the GALL Report

Comment 3.6.2-1

The paragraph before Table 3.6-1 states that the information is from the LRA. Also, the title of Table 3.6-1 and the column headings indicate that the table includes components evaluated in the GALL Report and AMPs that were presented in the RNP LRA. However, AMPs B.2.9, B.4.7, and B.4.8 were not in the original LRA, but were added in response to RAIs.

3.6.2.3.1.3 Conclusions

On the basis of its review and audit of the applicant=s program, the staff finds that those portions of the program for which the applicant claims consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions to the GALL program and finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Therefore, pending satisfactory resolution of Confirmatory Item 3.6.2.3.1.2-1, the staff concludes that actions have been identified and have been or will be taken to manage the effects of aging during the period of extended operation on the functionality of SCs subject to an AMR such that there is reasonable assurance that the activities authorized by a renewed license will continue to be conducted in accordance with the CLB, as required by 10 CFR 54.29(a).

Comment 3.6.2.3.1-2

Please delete the reference to GALL, since the Fuse Holder AMP is not a GALL program.

3.6.2.3.2.3 Conclusions

On the basis of its review and audit of the applicant=s program, the staff finds that those portions of the program for which the applicant claims consistency with the GALL program are consistent with the GALL program. In addition, the staff has reviewed the exceptions to the GALL program and finds that the applicant has demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and finds that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

Comment 3.6.2.3.2-1

Please delete the reference to GALL, since the Aging Management Program for Neutron Flux Instrumentation (B.4.8) is not a GALL program.

SECTION 4 COMMENTS

4.1.1 Summary of Technical Information in the Application

The applicant evaluated calculations for Robinson Nuclear Plant (RNP) against the six criteria specified in 10 CFR 54.3 to identify the TLAAs. The applicant indicated that calculations that meet the six criteria were identified by searching the current licensing basis (CLB), which includes the Updated Final Safety Analysis Report (UFSAR), design-basis documents, the statement of consideration for 10 CFR Part 54, NUREG-1800, and NEI 95-10. The applicant listed the following TLAAs in Table 4.1-1 of the LRA.

Comment 4.1-1

The second sentence in the first paragraph should be revised to read: "The applicant indicated that calculations that meet the six criteria were identified by searching: (1) current licensing basis documents, including Technical Specifications, the Updated Final Safety Analysis Report (UFSAR), Environmental Reports, docketed licensing correspondence, and (2) industry documents such as NUREG-1800, Westinghouse Owner's Group Topical Reports, and NEI 95-10."

4.3.1 Metal Fatigue - Summary of Technical Information in the Application

4.3.1, Paragraph 6

Section 4.3.1.4 of the LRA describes the applicant=s evaluation of the AFW line. The applicant reported a 1972 leakage, attributed to thermal fatigue cracking, at the 4"x16" connection between the auxiliary and main feedwater (AFW to FW) upstream of the B steam generator. The AFW connections were replaced with thermal-sleeved tees designed to ASME Code Section III, Subsection NB requirements (although this piping was designed originally using United States of America Standards (USAS) B31.1 Code). A fatigue analysis performed for the feedwater branch connection reinforcement plate resulted in an acceptable CUF value of less than 1.0 for the 40-year operating life and for the period of license renewal extended operation. The applicant indicated that the number of transients projected for the 60-year operational period is significantly less than the number of transients originally postulated for the 40-year life. Therefore, the applicant concluded that the fatigue analyses remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

Comment 4.3.1-1

The description in Section 4.3.1.4 of the LRA describes the evaluation of fatigue of the AFW line. The conclusions provided then have since changed, as is noted later in Section 4.3.2.1.4. The statement, "A fatigue analysis performed for the feedwater branch connection reinforcement plate resulted in an acceptable CUF value of less than 1.0 for the 40-year operating life and for the period of license renewal extended operation," is no longer valid. Therefore, this wording should either be deleted, or a notation should be added that explains that this initial information has been superseded.

Please refer to Section 4.3.2.1.4, Auxiliary Feedwater Line Fatigue Analysis, for the correct information that was provided in response to RAI 4.3-7.

4.5.2, Paragraph 3

In response to the RAI, the applicant provided the following table showing the calculated prestressing forces at the initial prestressing, at 40 years, and at 60 years after the installation of the forces.

Initial Value	**Value After One Year**	**Value After 40 Years**	**Value At 60 Years**	Prestress losses due to concrete shrinkage
N/A	4002 psi	1998 psi	0	Prestress losses due to concrete creep
N/A	6317 psi	3153 psi	0	Prestress losses due to tendon relaxation
N/A	6000 psi	2400 psi	1800 psi	Prestress losses due to elastic shortening
2104 psi	N/A	N/A	N/A	Tendon Prestress
120,000 psi	103,680 psi	96,128 psi	94,328 psi	**Minimum Required
Prestress	91,726 psi	91,726 psi	91,726 psi	91,726 psi

The staff reviewed the table in conjunction with the values estimated in the UFSAR. The staff also reviewed the modifications made by the applicant to the UFSAR values and discussed in 4.5.1 of this SER. The staff considers the modifications made to the concrete shrinkage value reasonable and acceptable. Based on the review of the applicant's estimated values at 40 and 60 years, the staff finds that the prestressing force imparted to the containment will be adequate during the period of extended operation.

Comment 4.5.2-2

Section 4.5.2, paragraph 3, describes "estimated values at 40 and 60 years." The reference to "40 years," is incorrect and should be revised to "50 years."

Comment 4.5.2-3

The table in Section 4.5.2 showing prestressing values appears to have been transposed incorrectly. The Description title is missing, the descriptions have shifted up relative to values, and the table states a value at 40 years, which should be 50 years. The table below displays the proper format and values:

Description	Initial Value	Value after one year	Value after 50 years	Value at 60 years
Prestress losses due to concrete shrinkage	N/A	4002 psi	1998 psi	0
Prestress losses due to concrete creep	N/A	6317 psi	3153 psi	0
Prestress losses due to tendon relaxation	N/A	6000 psi	2400 psi	1800 psi
Prestress losses due to elastic shortening	2104 psi	N/A	N/A	N/A
Tendon Prestress	120,000 psi	103,680 psi	96,128 psi	94,328 psi
Minimum Required Prestress	91,726 psi	91,726 psi	91,726 psi	91,726 psi

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<u>4.5.2, Paragraph 9</u>

The RAI essentially requested the applicant to explore the methods that could be used to assess and track the containment prestressing force and potential degradation of prestressing tendon components.

In response, the applicant provided the following information:

- Degradation (breakage) of prestressing wires (as discussed in Information Notice 99-10) occurred because the grease used to protect the wires and the anchorage components contained molybdenum disulfide, which decomposed and released hydrogen sulfide.
- Stress corrosion cracking occurs when high stress, corrosive environment, and susceptible material are present. Only one element is present in RNP containment prestress components (i.e., high stress).
- Surveillance blocks examined at 5 and 25 years showed no corrosion of the imbedded tendon material.
- Containment structural integrity tests were performed in 1970, 1974, and 1992, and comparisons are provided to the NRC in a letter dated October 7, 1992 (Serial No. NLS-92-262).
- The prestressing levels have been analytically determined to be sufficient through the period of extended operation. IWL examination will be continued during the EPO.
- To provide additional assurance of the tendon design capacity, tests (at integrated leak rate test pressure) similar to the structural integrity test performed in 1992, will be scheduled to coincide with the first and second Appendix J containment integrated leak rate test during the period of extended operation. The monitoring criteria of these tests will be limited to deformations and cracking associated with the vertical prestressed tendons and will not include radial or axial monitoring. The proposed tests will be performed in conjunction with the analytical determination of tendon prestress, the established corrosion resistance of the embedded tendons, the

previously completed structural integrity tests, and the ongoing inspections of concrete.

Comment 4.5.2-4

The first bullet under Section 4.5.2 appears to require clarification.

The RNP response RAI 5.4-2, dated April 28, 2003, stated the prestressing wires discussed in Information Notice 99-10 were covered with grease and that a common factor in several reported failures of threaded fasteners due to SCC appears to be the use of lubricants containing molybdenum disulfide. The RAI response did not state the wire breakage occurred because of the grease. The Information Notice stated that an engineering evaluation by Baltimore Gas & Electric indicated brittle hydrogen-induced cracking on a third of the broken wires, and that all of the brittle fractures were preceded by severe corrosion. The engineering evaluation did not identify the source of the hydrogen. The failures reported in Information Notice 99-10 were attributed to the ability of moisture to reach unprotected areas.

Therefore, revised wording for this bullet is proposed as follows:

> "Degradation (breakage) of prestressing wires (as discussed in Information Notice 99-10) was primarily attributed to the ability of moisture to reach unprotected areas; RNP tendons are completely encased in grout and are therefore not susceptible to moisture intrusion."

APPENDIX A COMMENTS

Appendix A: Commitment Listing

Comment A-1

Commitments should be as stated in letter RNP-RA/03-0103, dated September 16, 2003, with commitment 6 corrected by the letter that transmits these SER comments.

APPENDIX D COMMENTS

Appendix D: References

Comment D-1

The list of calculations in the References includes calculations that are not specifically referenced in the body of the Safety Evaluation Report. The listed calculations should be limited to those that are listed in the SER.