

Audit Plan For
License Renewal Application
Aging Management Programs
Aging Management Review Results

Brunswick Steam Electric Plant, Units 1 and 2
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License Renewal Application Audit Plan

Aging Management Programs and Aging Management Results

1. INTRODUCTION

By letter dated October 18, 2004, Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc. (the applicant) submitted to the U.S. Nuclear Regulatory Commission (NRC) its application for renewal of Operating Licenses DPR-17 and DPR-62 for Brunswick Steam and Electric Plant, Units 1 and 2, respectively. The applicant requested renewal of the operating license for an additional 20 years beyond the 40-year current license term.

In support of the NRC staff's safety review of the license renewal application (LRA) for the Brunswick Steam Electric Plant, Units 1 and 2, the License Renewal and Environmental Impacts Program, License Renewal Section B (RLEP-B), will lead a project team, which will audit and review selected aging management reviews (AMRs) and associated aging management programs (AMPs). This document is the RLEP-B plan for auditing and reviewing the AMPs and AMRs. The project team includes the NRC staff and Brookhaven National Laboratory engineers, who are listed in Appendix A, "Project Team Members," of this audit plan.

The project team will audit and review its assigned AMPs and AMRs against the requirements and guidance contained in the following documents:

- C Title 10 of the *Code of Federal Regulations*, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants"
- C NUREG-1800, "Standard Review Plan for Review of License Renewal Application for Nuclear Power Plants" (SRP-LR), issued July 2001
- C NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," issued July 2001

For the scope of work defined in this audit plan, the project team will evaluate whether the applicant's aging management activities and programs will adequately manage the effects of aging on structures and components, so that their intended functions will be maintained consistent with the Brunswick Steam Electric Plant (BSEP), Units 1 and 2, current licensing basis (CLB) for the extended period of operation.

The project team plans to perform its work at NRC Headquarters, Rockville, Maryland; at Brookhaven National Laboratory offices in Upton, New York, and at the applicant's offices at BSEP in Southport, North Carolina. The project team plans to perform its work in accordance with the schedule shown in Appendix B, "Schedule." The project team will conduct a public exit meeting at the applicant's offices in Southport, North Carolina, after it completes its on-site work.

2. BACKGROUND

10 CFR 54.4(a) states that plant systems, structures, and components (SSCs) within the scope of license renewal are:

- (1) Safety-related SSCs which are relied upon to remain functional during and following design-basis events
- (2) All non-safety related SSCs whose failure could prevent satisfactory accomplishment of any of the functions identified for safety-related SSCs
- (3) All SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for fire protection, environmental qualification, pressurized thermal shock, anticipated transients without scram, and station blackout.

An applicant for a renewed license must review all SSCs within the scope of license renewal to identify those structures and components (SCs) subject to an AMR. SCs subject to an AMR are those that perform an intended function without moving parts or without a change in configuration or properties (passive), and that are not subject to replacement based on qualified life or specified time period (long-lived). Pursuant to 10 CFR 54.21(a)(3), an applicant for a renewed license must demonstrate that the effects of aging will be managed in such a way that the intended function or functions of those SCs will be maintained, consistent with the CLB, for the extended period of operation. 10 CFR 54.21(d) requires that the applicant submit a supplement to the updated final safety analysis report (UFSAR) that contains a summary description of the programs and activities that it credited to manage the effects of aging during the extended period of operation.

The SRP-LR provides staff guidance for reviewing license renewal applications. In particular, the SRP-LR provides guidance for further evaluation of aging management programs as recommended by the GALL report and identifies associated technical positions that are acceptable to the staff.

The GALL Report contains the staff's generic evaluation of the existing plant programs and documents the technical basis for determining where existing programs are adequate without modification and where existing programs should be augmented for the extended period of operation. The evaluation results documented in the GALL Report indicate that many of the existing programs are adequate to manage the aging effects for particular structures or components for license renewal without change. If an applicant commits to implementing these staff-approved aging management programs (AMPs), the time, effort, and resources needed to review an applicant's LRA will be greatly reduced, thereby improving the efficiency and effectiveness of the license renewal review process.

The GALL Report identifies the structures and components that are within the scope of license renewal and subject to an AMP. For each structure or component in a system, the GALL Report identifies the associated materials, environments, and aging effects to which the components are exposed, and the AMPs that are acceptable to the staff for managing the aging effects. The GALL Report also identifies those AMPs that require further evaluation.

The GALL Report is treated in the same manner as an approved topical report that is generically applicable. An applicant may reference the GALL Report in its LRA to demonstrate

that its programs correspond to those that the staff reviewed and approved in the GALL Report. If the material presented in the LRA is consistent with the GALL Report and is applicable to the applicant's facility, the staff will accept the applicant's reference to the GALL Report. In making this determination, the staff considers whether the applicant has identified specific programs described and evaluated in the GALL Report but does not conduct a re-review of the substance of the matters described in the GALL Report. Rather, the staff determines that the applicant verified that the approvals set forth in the GALL Report apply to its programs.

If an applicant takes credit for a GALL AMP, it is incumbent on the applicant to ensure that the plant AMP contains all the program elements of the referenced GALL AMP. In addition, the conditions at the plant must be bounded by the conditions for which the GALL AMP was evaluated. The applicant must certify in its LRA that it completed the verifications and that they are documented on-site in an auditable form.

3. OBJECTIVES

The overall objective of the audit and review described in this plan is to evaluate compliance with 10 CFR 54.21(a)(3) such that for each identified SSC the applicant demonstrates that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the extended period of operation. The audit and review process ensures that for each structure and component that is within the scope of the project team's review the effects of aging will be adequately managed.

The audit and review procedure is described in Sections 5 and 6 of this plan. The plan objectives are:

- C For plant AMPs that the applicant claims are consistent with GALL AMPs, evaluate whether the plant AMPs contain the program elements of the referenced GALL AMP (for the seven program elements that are within the scope of review of the project team) and that the conditions at the plant are bounded by the conditions for which the GALL AMPs were evaluated.
- C For plant AMPs that the applicant claims are consistent with GALL AMPs with exceptions, evaluate whether the plant AMPs contain the program elements of the referenced GALL AMPs and that the conditions at the plant are bounded by the conditions for which the GALL AMPs were evaluated. In addition, evaluate whether the applicant has documented an acceptable technical basis for each exception.
- C For plant AMPs that the applicant claims will be consistent with GALL AMPs after specified enhancements are implemented, evaluate whether the plant AMPs, with the enhancements, will be consistent with the referenced GALL AMPs, or are acceptable on the basis of a technical review. In addition, evaluate whether the applicant identified the enhancements as commitments in the UFSAR supplement or other docketed correspondence.
- C For plant-specific AMPs that the applicant claims are consistent with AMPs that the staff has previously approved for another plant, verify the AMPs are acceptable on the basis of a technical review.
- C For AMRs that the applicant claims are consistent with the GALL Report, evaluate whether the plant AMRs are consistent with the criteria of the GALL.

- C For AMR line items for which the GALL Report recommends further evaluation, assess whether the applicant has addressed the further evaluation, and evaluate the AMRs in accordance with the SRP-LR.

4. SUMMARY OF INFORMATION PROVIDED IN THE LICENSE RENEWAL APPLICATION

The BSEP LRA closely follows the standard LRA format presented in NEI 95-10, “Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule,” Revision 3, April 2001. Section 3 of the LRA provides the aging management review results for the structures and components identified by the applicant.

LRA Table 3.0-1 and Table 3.0-2 provide descriptions of internal and external service environments, used in the AMRs to determine the aging effects requiring management. Results of the AMRs are presented in two different types of tables. The applicant refers to the two types of tables as Table 1 and Table 2.

The first table type is a series of six tables labeled Table 3.X.1, where “X” is the system/component group number (see table below), and “1” indicates a Table 1 type. For example, in the reactor vessel, internals, and reactor coolant system subsection of the LRA Section 3, this is Table 3.1.1, and in the engineered safety features subsection of LRA Section 3, this is Table 3.2.1.

X	Definition
1	Reactor Vessel, Internals, and Reactor Coolant System
2	Engineered Safety Features
3	Auxiliary Systems
4	Steam and Power Conversion Systems
5	Containments, Structures, and Component Supports
6	Electrical and Instrumentation and Controls

The second table type is a series of tables labeled Table 3.X.2-Y, where “X” is the system/component group number, “2” indicates it is a Table 2 type, and “Y” indicates the subgroup number within group “X”. For example, within the “reactor vessel, internals, and reactor coolant system” (group 1), the AMR results for the reactor vessel and internals (subgroup 1) are presented in LRA Table 3.1.2-1, and the results for the neutron monitoring system (subgroup 2) are presented in LRA Table 3.1.2-2. Under the “engineered safety features” (group 2), the residual heat removal system (subgroup 1) results are presented in Table 3.2.2-1 of the LRA, and the containment atmospheric control system (subgroup 2) is in Table 3.2.2-2 of the LRA.

In LRA Tables 3.1.1 through 3.6.1 (Table 1 types), the applicant provides a summary of the

comparison of its AMR results to the GALL Report. These LRA tables are similar to Tables 1 through 6 of the GALL Report, Volume 1. The applicant added a "Discussion" column, which includes additional information that may be useful to the projects team. Also, the applicant added an "Item Number" column, which provides a means to cross-reference between an LRA Table 3.X.2-Y (Table 2 type) and an LRA Table 3.X.1 (Table 1 type).

The following are examples of information that might be contained within the "Discussion" column:

- C Any "Further Evaluation Recommended" information or reference to the location of that information;
- C The name of a plant-specific program being used;
- C Exceptions to the GALL Report assumptions;
- C A discussion of how the line item is consistent with the corresponding line item in the GALL Report, when it may not be intuitively obvious;
- C A discussion of how the line item differs from the corresponding line item in the GALL Report, when it may appear to be consistent.

LRA Table 2 types provide the detailed results of the AMRs for those SCs that are subject to an aging management review. There is a Table 2 for each subgroup within the six system/component groups. For example, the engineered safety features group contains tables specific to residual heat removal, containment atmosphere control, high pressure coolant injection, automatic depressurization, core spray, evaluation standby gas treatment, standby liquid control, HVAC control building, and reactor protection. All LRA Table 2's consist of the following nine columns.

- C *Component Commodity*. Column 1 identifies the component or commodity types that are subject to an AMR. The component or commodity types are listed in alphabetical order.
- C *Intended Function*. Column 2 identifies the license renewal intended functions for the listed component and commodities. Definitions and abbreviations of intended functions are listed in Table 2.0-1 in Section 2 of the LRA.
- C *Material*. Column 3 lists the materials of the component or commodity type being evaluated.
- C *Environment*. Column 4 lists the environment to which the component types are exposed. Internal and external service environments are indicated. A description of the internal and external environments is provided in LRA Table 3.0-1 and Table 3.0-2, respectively.
- C *Aging Effect Requiring Management*. Column 5 lists the aging effects identified as requiring management for the material and environment combinations of each component type.
- C *Aging Management Program*. Column 6 lists the program(s) used to manage the aging

effect.

- C *NUREG-1801 Volume 2 Item.* The applicant compared each combination of component type, material, environment, aging effect requiring management, and aging management program factors listed in LRA Table 2 to the GALL Report to identify consistencies. In Column 7, the applicant documents identified consistencies by noting the appropriate GALL Report item number. If there is no corresponding item number in the GALL Report for a particular combination of factors, column 7 is left blank.
- C *Table 1 Item.* The applicant compared each combination of component type, material, environment, aging effect requiring management, and aging management program that has an identified GALL Report item number and a Table 1 line item reference number. Column 8 lists the corresponding line item from Table 1. If there is no corresponding item in the GALL Report, column 8 is left blank.
- C *Notes.* Column 9 contains notes that are used to describe the degree of consistency with the line items in the GALL Report. Notes that use letter designations are standard notes based on a letter from A. Nelson, NEI, to P. T. Kuo, NRC, "U.S. Nuclear Industry's Proposed Standard License Renewal Application Format Package, Request NRC Concurrence," dated January 24, 2003 (ML030290201). The staff concurred with the NEI standardized format for license renewal applications by letter dated April 7, 2003, from P.T. Kuo, NRC, to A. Nelson, NEI (ML030990052). The standard notes are shown in Table 2 of this plan. Notes that use numeric designators are specific to Brunswick Steam Electric Plant.

LRA Table 2 contains the aging management review results and indicates whether the results correspond to line items in the GALL Report. Correlations between a combination in LRA Table 2 and a combination in Volume 2 of the GALL Report are identified in column 7 of Table 2. If column 7 is blank, the applicant did not identify a corresponding combination in the GALL Report.

If the applicant identified a GALL Report line item, column 8 provides a reference to a Table 1 row number. This reference corresponds to the GALL Report, Volume 2, "roll-up" to the GALL Report, Volume 1, tables. Many of the GALL Report evaluations recommend a plant-specific program. In these cases, the applicant considers its AMR evaluation to be consistent with the GALL Report, if an appropriate plant-specific AMP has been credited to manage aging.

5. OVERVIEW OF AUDIT, AND DOCUMENTATION PROCEDURE

The project team will follow the procedure specified in Section 6 of this plan to perform its audits and to document the results of its work. The audit process covered by the procedure is summarized below.

5.1 Aging Management Programs

Table 1 of this plan summarizes the 10 program elements that comprise an aging management program. Of these 10 program elements, program elements 1 through 6, and program element 10 are within the project team's scope of review. The NRC Division of Inspection Program Management (DIPM) is responsible for reviewing program elements 7, 8, and 9, which will be addressed as part of the applicant's quality assurance program. The results of the DIPM staff's reviews will be documented in Section 3 of the safety evaluation report associated with the LRA

safety review.

The project team will review the AMPs that the applicant claims are consistent with GALL AMPs, and compare the BSEP AMP program elements 1 through 6 and program element 10 to the corresponding AMP program elements in the GALL Report. The project team will evaluate whether each BSEP AMP contains the program elements of the referenced GALL AMP, and that the conditions at the plant are bounded by the conditions identified in the GALL AMP.

The project team will evaluate each of the BSEP AMPs that have an exception or an enhancement to an associated AMP in the GALL Report. The project team will identify the difference(s) between the BSEP AMP and the associated AMP in the GALL Report, and determine whether the BSEP AMP, as modified by the difference(s), will adequately manage the aging effects for which it is credited.

The project team will review two (2) BSEP AMPs that are not included in the GALL Report (i.e., plant-specific AMPs). In this case, the project team will review the AMP against the seven program elements that are within its scope of review. The project team will determine whether these AMPs are adequate to manage the aging effects for which they are credited.

5.2 Aging Management Reviews

The AMRs in the GALL Report fall into two broad categories: (1) those that the GALL Report concludes are adequate to manage aging of the components referenced in the GALL Report, and (2) those for which the GALL Report concludes that aging management is adequate, but further evaluation is recommended for certain aspects of the aging management process. For AMR reviews, the project team will determine (1) whether the AMRs reported by the applicant to be consistent with the GALL Report are indeed consistent with the GALL Report, and (2) whether the plant-specific AMRs reported by the applicant to be based on a previously-approved precedent are technically acceptable and applicable. For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the project team will review the applicant's evaluation to determine if it adequately addressed the issues for which the GALL Report recommends further evaluation.

5.3 UFSAR Supplement Review

In accordance with the SRP-LR, the project team will review the applicant's UFSAR supplement, to ensure (1) that the applicant's programs and activities credited for aging management are summarized, and (2) that any commitments to enhance the applicant's AMPs, in order to be consistent with the AMPs evaluated in the GALL Report, are documented.

Consistent with the SRP-LR, for the AMRs and associated AMPs that it will review, the project team will review the UFSAR supplement that summarizes the applicant's programs and activities for managing the effects of aging for the extended period of operation. The project team will also review any commitments associated with its programs and activities made by the applicant and evaluate whether they are acceptable for the stated purpose.

5.4 Documents Reviewed by the Project Team

In performing its work, the project team will rely heavily on the LRA, the audit plan, the SRP-LR, and the GALL Report. The project team will also examine the applicant's precedent review

documents, its AMP and AMR basis documents (catalogs of the documentation used by the applicant to develop or justify its AMPs and AMRs), and other applicant documents, including selected implementing procedures, to evaluate whether the applicant's activities and programs will adequately manage the effects of aging on structures and components.

5.5 Public Exit Meeting

After it completes its audits and reviews, the project team will hold a public exit meeting to discuss the scope and results of its audits and reviews.

5.6 Documentation Prepared by the Project Team

The project team will prepare an audit plan, worksheets, work packages, requests for additional information (RAIs), an audit report, and safety evaluation report (SER) inputs. The project team will also prepare questions during site visits and will track the applicant's responses to the questions.

5.6.1 Worksheets

Each project team member will informally document the results of his or her work on a variety of worksheets. The worksheets are shown in Appendix E, "Consistent with GALL Report AMP Audit/Review Worksheet"; Appendix F, "Plant-Specific AMP Audit/Review Worksheet"; and Appendix G, "Aging Management Review Worksheets." The use of the worksheets is described in Section 6 of this plan.

5.6.2 Questions

As specified in Section 6 of this plan, the project team members will ask the applicant questions during on-site audits, as appropriate, to facilitate its audit and review activities. The project team will also track and evaluate the applicant's answers to the questions.

5.6.3 Work Packages

After each on-site audit, the project team leader, in conjunction with the project manager, will assemble work packages for any work that the project team will refer to the NRR Division of Engineering (DE) for review. Each work package will include a work request and any applicable background information gathered by the project team.

5.6.4 Requests for Additional Information

The review process described in this plan is structured to resolve as many questions as possible during the site visits. As examples, the site visits are used to obtain clarifications about the LRA and explanations as to where certain information may be found in the LRA or its associated documents. Nevertheless, there may be occasions where an RAI is appropriate to obtain information to support an SER finding. The need for RAIs will be determined by the project team leader during the site visits through discussions with the individual project team members. When the project team leader determines that an RAI is needed, the project team member who is responsible for the area of review will prepare the RAI. RAIs will include the technical and regulatory basis for requesting the information.

After the NRC receives a response to an RAI from the applicant, the project team leader will

provide the response to the project team member who prepared the RAI. The project team member will review the response and determine if it resolves the issue addressed in the RAI. The project team member will document the disposition of the RAI in the audit report (unless the report was issued before the RAI response was received) and in the SER input. If the audit report was issued before the applicant submitted its response to an RAI, the review of the response will be documented in the SER.

5.6.5 Audit Report

The project team will document the results of its work in an audit report. The project team will prepare its report as described in Section 6.4.1 of this plan and the latest version of the *RLEP-B Guidelines for Preparing Audit Reports*.

5.6.6 Safety Evaluation Report Input

The project team will prepare SER inputs that are based on the audit report, as described in Section 6.4.2 of this plan.

6. PLANNING, AUDIT, AND DOCUMENTATION PROCEDURE

This section of the audit plan contains the detailed procedures that the project team will follow to plan, perform, and document its work.

6.1 Planning Activities

6.1.1 Schedule for Key Milestones and Activities

The project manager, the project team leader, and the applicant will establish the schedule for on-site visits. The project team leader prepares the schedule for the key milestones and activities, consistent with the overall schedule developed by the project manager. The key milestones and activities schedule for the AMP and AMR audit of the Brunswick Steam Electric Plant, Units 1 and 2 license renewal application is provide in Appendix B of this audit plan.

6.1.2 Work assignments

The project team leader should use the contracting process to identify the contractor personnel who will be members of the project team. The project team leader will approve all work assignments and may re-assign work as necessary.

The contractor will develop the assignment tables that identify which project team member will review each assigned AMP and AMR. Appendix A of this plan contains the project team membership. Appendix C contains the project team member assignments for the AMPs. Appendix D of this plan contains the project team member assignments for the AMRs.

6.1.3 Training and Preparation.

The project team leader should hold a project team meeting to review the following information. Each project team member should review the relevant sections of the following documents prior to the first on-site audit.

- C NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for

Nuclear Power Plants,” issued July 2001

- C NUREG-1801, “Generic Aging Lessons Learned (GALL) Report,” issued July 2001
- C Staff position letters concerning interim staff guidance for license renewal issues
- C Brunswick Steam Electric Plant License Renewal Application.

In preparation for the on-site audits, the project team members will review their assigned AMPs or AMRs and examine relevant safety evaluation reports, audit reports, and/or requests for additional information from prior staff LRA reviews. In addition, if feasible, the project team members should identify the applicant’s basis documents and implementing procedures that they plan to audit on-site. Any questions identified by the project team members during the pre-audit reviews may be transmitted to the applicant prior to the on-site audits.

The project team leader is the point of contact with the licensee. Project team members may work directly with the licensee’s staff to gather information and understand the information contained in the license renewal application. However, the project team leader is the only project team member who can make formal requests or agreements with the licensee.

The project team leader is the point of contact with the NRC technical staff. Project team members may work directly with the NRC technical staff to exchange technical information concerning the audit of the license renewal application. However, the project team leader is the only project team member who can make formal requests or agreements with the NRC technical staff.

The NRC Management Directives and the contract requirements will govern the project team’s travel requirements, work hours, issuance of request for additional information, and control of licensee documents.

6.2 Aging Management Program Audits

There are two types of AMPs: those that the applicant claims are consistent with AMPs contained in the GALL Report, and those that are plant-specific. The process for auditing and reviewing both types of AMPs is presented in the following sections of this plan.

6.2.1 Scope of AMP Elements to be Audited

Table 1 of this plan shows the 10 program elements that are used to evaluate the adequacy of each aging management program. These program elements are presented in Branch Technical Position (BTP) RLSB-1, “Aging Management Review - Generic,” in Appendix A of the SRP-LR, and are summarized in the GALL Report. The project team’s scope of review includes elements 1 through 6 and element 10. The Division of Inspection Program Management is responsible for reviewing elements 7, 8, and 9, as part of its assessment of the applicant’s quality assurance program. The program elements audited or reviewed is the same for both AMPs that are consistent with the GALL Report and for plant-specific AMPs.

6.2.2 Plant AMPs That Are Consistent With the GALL Report

The flowchart for the audit of AMPs that are consistent with the GALL report is presented in Figure 1 of this audit plan. The flowchart shows the activities and decisions used by the project

team to review and audit each plant AMP that the applicant claims is consistent with the GALL Report. In preparation for the audit, the project team members will review each of the AMPs they have been assigned, identify the corresponding GALL AMPs, and determine the elements that will be audited. Then the project team members should identify the documents needed to perform the audit.

Once on site, the project team members should use the plant-specific basis document and implementing procedures to confirm that the AMP elements are consistent with the corresponding AMP elements in the GALL Report. In addition, the project team members should identify any exceptions to the AMP elements in the GALL Report. If an AMP element is inconsistent with the corresponding AMP element in the GALL Report, the project team members should determine whether the inconsistency is acceptable, develop a technical basis, and document their assessments.

The project team members should use the worksheet provided in Appendix E of this audit plan to record information necessary to document the results of their assessments in the audit report.

The project team members should confirm the effectiveness of each AMP by reviewing industry and plant-specific operating. The project team members should consider the following industry guidance from NEI 95-10, Revision 3, when assessing operating experience.

- C Operating Experience - Aging Effects Requiring Management. A plant-specific operating experience review should assess the operating and maintenance history. A review of the prior five to 10 years of operating and maintenance history should be sufficient. The results of the review should confirm consistency with documented industry operating experience. Differences with previously documented industry experience such as new aging effects or lack of aging effects allow consideration of plant-specific aging management requirements.
- C Operating Experience with Aging Management Programs. Plant-specific operating experience with existing programs should be considered. The operating experience of aging management programs, including past corrective actions resulting in program enhancements or additional programs, should be considered. The review should provide objective evidence to support the conclusion that the effects of aging will be managed so that the intended function(s) will be maintained during the extended period of operation. Guidance for reviewing industry operating experience is presented in BTP RLSB-1 in Appendix A.1 of the Branch Technical Positions in NUREG-1800.
- C Industry Operating Experience. Industry operating experience and its applicability should be assessed to determine whether it changes plant-specific determinations. NUREG-1801 is based upon industry operating experience prior to its date of issue. Operating experience after the issue date of NUREG-1801 should be evaluated and documented as part of the aging management review. In particular, generic communications such as a bulletin or an information notice should be evaluated for impact upon the AMP. The evaluation should check for new aging effects or a new component or location experiencing a previously identified aging effect.

Any questions resulting from the audit will be discussed with the applicant, and either resolved by the project team or turned over to the NRC technical staff for resolution. If it is necessary for the applicant to submit additional information to support the basis for accepting a program element, an exception, or a difference, the applicant may agree to voluntarily submit the

required information as a supplement to the LRA.

6.2.4 Plant-specific AMPs

The project team will review one (1) of the five (5) plant-specific AMPs identified in Appendix B of the Brunswick LRA. The NRC technical staff will review the remaining four (4) plant-specific AMPs.

The flowchart for the review of plant-specific AMPs is presented in Figure 2 of this audit plan. The flowchart shows the activities and decisions used by the project team to review a plant-specific AMP. In preparation for the on-site audit, the assigned project team member will review the plant-specific AMP, and identify documents needed to perform the review.

Once on site, the project team member should use the plant-specific basis document and implementing procedures to confirm that the seven program elements of the plant-specific AMP are consistent with the corresponding program elements in Section A.1.2.3 of the SRP-LR. The project team member should identify any exceptions to the program elements in Section A.1.2.3 of the SRP-LR. If a program element of the plant-specific AMP is inconsistent with the corresponding program element in Section A.1.2.3 of the SRP-LR, the project team member should determine whether the inconsistency is acceptable, develop a technical basis, and document the assessment.

The project team member should use the worksheet provided in Appendix F of this audit plan to record information necessary to document the results of the assessment in the audit report.

The project team member should evaluate the effectiveness of the plant-specific AMP by reviewing industry and plant-specific operating. The project team member should consider the following industry guidance from NEI 95-10, Revision 3, when assessing operating experience.

- C Operating Experience - Aging Effects Requiring Management. A plant-specific operating experience review should assess the operating and maintenance history. A review of the prior five to 10 years of operating and maintenance history should be sufficient. The results of the review should confirm consistency with documented industry operating experience. Differences with previously documented industry experience such as new aging effects or lack of aging effects allow consideration of plant-specific aging management requirements.
- C Operating Experience with Aging Management Programs. Plant-specific operating experience with existing programs should be considered. The operating experience of aging management programs, including past corrective actions resulting in program enhancements or additional programs, should be considered. The review should provide objective evidence to support the conclusion that the effects of aging will be managed so that the intended function(s) will be maintained during the extended period of operation. Guidance for reviewing industry operating experience is presented in BTP RLSB-1 in Appendix A.1 of the Branch Technical Positions in NUREG-1800.
- C Industry Operating Experience. Industry operating experience and its applicability should be assessed to determine whether it changes plant-specific determinations. NUREG-1801 is based upon industry operating experience prior to its date of issue. Operating experience after the issue date of NUREG-1801 should be evaluated and documented as part of the aging management review. In particular, generic communications such as

a bulletin or an information notice should be evaluated for impact upon the AMP. The evaluation should check for new aging effects or a new component or location experiencing a previously identified aging effect.

Any questions resulting from the audit will be discussed with the applicant, and either resolved by the project team or turned over to the NRC technical staff for resolution. If it is necessary for the applicant to submit additional information to support the basis for accepting a program element, an exception, or a difference, the applicant may agree to voluntarily submit the required information as a supplement to the LRA.

6.3 Audit of Aging Management Review (AMR) Results

There are two types of AMRs: those that the applicant claims are consistent with the GALL Report, and those that are plant-specific. The project team will review AMRs that are consistent with the AMRs in the GALL Report.

6.3.1 Scope of AMR to be Audited

The NRC staff has split the responsibility for assessing the aging management review results in the license renewal application between the project team and the NRC technical staff. The project team will assess the AMRs that are consistent with the GALL report. Each AMR line item is coded with a letter which represents a standard note designation. The letter notes are described in Table 2 of this plan. The notes coded with A through E are classified as “consistent with the GALL Report,” and will be addressed by the project team in accordance with the guidance contained in this plan. Notes that use numeric designators are plant-specific and provide additional information to be considered during the staff assessment.

6.3.2 AMR Results That Are Consistent With the GALL Report

The flowchart for the audit of AMRs that are consistent with the GALL report is presented in Figures 3-1 and 3-2 of this audit plan. The flowchart shows the activities and decisions used by the project team to review and audit each plant AMR that the applicant claims is consistent with the GALL Report. In preparation for the audit, the project team members will review each of the AMRs they have been assigned and identify the corresponding AMRs in the GALL Report.

The AMR review involves evaluating whether the applicant has satisfied the requirements of 10 CFR 54.21(a)(3). This requirement states that for each structure and component, within the scope of license renewal, the applicant demonstrates that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis of the plant for the extended period of operation. The project team should evaluate compliance by following the process shown in Figures 3-1 and 3-2. The process is summarized below:

- C Project team members should review each assigned AMR line and determine if the AMR is consistent with the GALL Report.
- C Note A indicates: The applicant identifies a plant-specific AMP. Some GALL AMRs reference the use of a plant-specific AMP. In such cases the AMR audit requires the project team member to confirm that the plant-specific AMP is appropriate to manage the aging effects during the extended period of operation, determine if the component is within the scope of the cited plant AMP. If the component is within the scope of the plant AMP, the AMR line item is acceptable. If not acceptable, go to Step (7) below.
- C Note B indicates that the identified AMP takes some exceptions to the GALL Report. The project team should evaluate the AMP exceptions and document its assessment.
- C Notes C and D identify components that are not consistent with the GALL report. The project team should evaluate the acceptability of the component type for the material, environment, and aging effect. If Note D applies the project team should also evaluate the acceptability of the AMP exceptions and document the results of its assessment.

- C Note E identifies an AMP that is inconsistent with the AMP identified in the GALL report. The project team should evaluate the AMP to determine if the scope of the alternate AMP envelopes the AMR line item and satisfies 10 CFR 54.21(a)(3). The project team should document the results of its assessment.
- C The project team should evaluate the corresponding LRA Table 3.X.1 entry that is referenced in LRA Table 3.X.2.Y. If applicable, the project team will determine whether the applicant's "Further Evaluation Recommended" response in LRA Section 3.X.2.2.Z is enveloped by Section 3.X.2.2.Z of the SRP-LR, and document its assessment.

The project team members will prepare questions for the applicant whenever additional information or clarifications are needed. The project team will evaluate the applicant's responses. When a response does not resolve the issue, the project team should prepare additional questions. If it is necessary for the applicant to submit additional information to resolve an issue, the applicant may submit the information as a supplement to the LRA or the NRC may issue an RAI to obtain the information. The project team leader should be consulted if docketed information is needed.

The project team members should use the worksheet provided in Appendix G of this audit plan to record information necessary to document the results of their assessments in the audit report.

6.4 Audit Documentation

As noted in Section 5.7 of this plan, the project team will prepare an audit plan, worksheets, work packages, requests for additional information, an audit report, and a SER input. This section of the plan addresses the preparation of the audit report and the SER input.

6.4.1 Audit Report

The project team should prepare input to the audit report in accordance with the guidance provided in the Writing Guide and Template for Preparing License Renewal Application Audit Report. The audit report should follow the following format:

- Cover page
- Table of Contents
- Section 1 Introduction and General Information
 - Section 1.1 Introduction
 - Section 1.2 Background
 - Section 1.3 Summary of Information in the License Renewal Application
 - Section 1.4 Audit Scope
 - Section 1.5 Audit Process
 - Section 1.6 Exit Meeting
- Section 2 Aging Management Programs (AMP)
- Section 3 Aging Management Review (AMR) Results
- Attachment 1 Abbreviations and Acronyms
- Attachment 2 Project Team and Applicant Personnel
- Attachment 3 Elements of an Aging Management Program for License Renewal
- Attachment 4 Disposition of Requests for Additional Information, LRA Supplements,

and Open Items

- Attachment 5 List of Documents Reviewed
- Attachment 6 List of Commitments

6.4.2 Safety Evaluation Report Input

Each project team member should prepare the SER input for the AMP and AMR audits and reviews that he or she performed. The technical assistance contractor will collect, assemble, and prepare the complete SER input.

In general, the data and information needed to prepare the SER input should be available in the project team's audit report and the project team member's worksheets. The project team should prepare the following:

- C Assessments for each AMP that was determined to be consistent with the GALL Report
- C Assessments for each AMP that was determined to be consistent with the GALL Report, which has exceptions or enhancements.
- C Assessment of the operating experience associated with each AMP
- C Assessment of the FSAR supplement associated with each AMP
- C Assessment of AMR results that are consistent with the GALL Report
- C Conclusions of the acceptability of AMPs and AMR results

The project team's SER input will provide information for the following SER sections. The project team will format its SER inputs to correspond to the following SER section numbers (3. through 3.X.3). The SER section numbers are not a continuation of the numbering convention used throughout this audit plan.

- 3. Aging Management Review Results
 - 3.0. Applicant's Use of the Generic Aging Lessons Learned Report
 - 3.0.1. Format of the LRA
 - 3.0.2. Staff's Review Process
 - 3.0.2.1. AMRs in the GALL Report
 - 3.0.2.2. NRC-Approved Precedents
 - 3.0.2.3. UFSAR Supplement
 - 3.0.2.4. Documentation and Documents Reviewed
 - 3.0.3. Aging Management Programs
 - 3.0.3.1. AMPs that are Consistent With the GALL Report
 - 3.0.3.2. AMPs that are Consistent With GALL Report With Exceptions or Enhancements
 - 3.0.4. Quality Assurance Program Attributes Integral to Aging Management Programs
 - 3.X.¹ Aging Management of _____

¹ The LRA AMR results are broken down into six sections and address the following system/structure groups: (1) Section 3.1, reactor vessel, internals and reactor coolant system, (2) Section 3.2, engineering safety features systems, (3) Section 3.3, auxiliary systems, (4) Section 3.4, steam power and conversion

- 3.X.1. Summary of Technical Information in the Application
- 3.X.2. Staff Evaluation
 - 3.X.2.1. Aging Management Evaluations that are Consistent with the GALL Report, for Which Further Evaluation is Not Required
 - 3.X.2.2. Aging Management Evaluations that are Consistent with the GALL Report, for Which Further Evaluation is Recommended
 - 3.X.2.3. AMR Results that are Not Consistent with or Not Addressed in the GALL Report
- 3.X.3. Conclusion

The project team will provide a discussion of its assessment of operating experience for each AMP that it evaluated. The project team will provide a discussion of its assessment of the FSAR supplement for each AMP that it evaluated.

The project team will document the applicant's amendments and supplements to the LRA by summarizing the issue that the amendment or supplement resolved and the project team's assessment and basis for resolving the issue. The project team will document the date and ADAMS accession number for each amendment or supplement.

The project team will document any requests for additional information (RAI) issued by the team, summarize the RAI, and identify the RAI number. The project team will document the applicant's response to the RAI by summarizing the response and the project team's assessment and basis for resolving the RAI. The project team will document the date and ADAMS accession number for each RAI response. The project team will identify unresolved RAIs as open items.

For AMPs determined to be consistent with the GALL Report, without exceptions, include the AMP title, the plant AMP paragraph number, and a discussion of the basis for concluding that the UFSAR supplement (Appendix A of the LRA) is acceptable. This SER input documents that the AMP is consistent with the GALL Report.

For AMPs determined to be consistent with the GALL Report, with exceptions or enhancement, the SER input should include a statement that the audit found the AMP consistent with the GALL Report and that any applicant-identified exceptions to the GALL Report were found technically acceptable to manage the aging effect during the extended period of operation. The SER input should identify the exceptions and provide the basis for acceptance. The SER input will also address the UFSAR supplement, and document the basis for concluding that it is acceptable.

For plant-specific AMPs, the SER input should document the basis for accepting each of the seven program elements reviewed by the project team. The SER input should also include a discussion concerning the adequacy of the UFSAR supplement.

For AMR evaluations that are consistent with the GALL Report, and for which no further evaluation is recommended, the SER input should include the following:

- C Identify the LRA section reviewed
- C A summary of the type of information provided in the section of the LRA reviewed,

systems, (5) Section 3.5, structures and component supports, (6) Section 3.6, electrical and instrumentation and controls.

- including a listing of the AMPs reviewed.
- C Identify the LRA Tables 3.X.2-Y reviewed.
- C A summary review of the AMR Notes A through E used to classify the AMR line items used in these tables.
- C A brief summary of what the staff (project team) reviewed to perform the audit, i.e., LRA and applicant basis documents and other implementation documents. Reference the appendix that lists the details of the documents reviewed.
- C The bases for accepting any exceptions to GALL AMRs that were identified by the applicant or the project team member.
- C A finding that the applicant identified the applicable aging effects
- C A finding that the applicant defined the appropriate combination of materials and environments
- C A finding that the applicant specified acceptable AMPs
- C A conclusion stating, if applicable, 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 extended period of operation, and that 10 CFR 54.21(a)(3) has been satisfied.

For AMR evaluations that are consistent with the GALL Report, for which further evaluation is recommended, the SER input should include the following:

- C The LRA section containing the applicant's further evaluations of AMRs for which further evaluation is required.
- C A list of the aging effects for which the further evaluations apply.
- C For the applicant's further evaluations, provide a summary of the basis for concluding that it satisfied the criteria of Section 3.X.3.2 of the SRP-LR (X=1, 2, 3, 4, 5, or 6 as applicable).
- C A statement that the staff audited the applicant's further evaluations against the criteria contained in Section 3.X.3.2 of the SRP-LR.
- C A statement that the audit report contains additional information. Also identify the issue date and the ADAMS accession number for the audit report.

6.5 Documents Reviewed and Document Retention

The project team should document in Attachment 5 to the audit report any procedures, design basis documents, or engineering reports used to formulate the basis for its assessment of AMPs or AMRs. After the audit report is issued, the project team members should submit all worksheets generated during the audit to the project team leader.

After the renewed license is issued, the project team members should discard the documents collected or generated during the creation of the audit report and SER inputs. Examples of these documents are audit worksheets, questions, answers, issue tracking lists, and personal notes. Documents that are on the docket or are publicly available may be retained.

TABLE 1

AGING MANAGEMENT PROGRAM ELEMENT DESCRIPTIONS

Element		Description
1	Scope of the program	The scope of the program should include the specific structures and components subject to an aging management review.
2	Preventive actions	Preventive actions should mitigate or prevent the applicable aging effects.
3	Parameters monitored or inspected	Parameters monitored or inspected should be linked to the effects of aging on the intended functions of the particular structure and component.
4	Detection of aging effects	Detection of aging effects should occur before there is loss of any structure and component intended function. This includes aspects such as method or technique (i.e., visual, volumetric, surface inspection), frequency, sample size, data collection and timing of new/one-time inspections to ensure timely detection of aging effects.
5	Monitoring and trending	Monitoring and trending should provide prediction of the extent of the effects of aging and timely corrective or mitigating actions.
6	Acceptance criteria	Acceptance criteria, against which the need for corrective action will be evaluated, should ensure that the particular structure and component intended functions are maintained under all current licensing basis design conditions during the extended period of operation.
7	Corrective actions	Corrective actions, including root cause determination and prevention of recurrence, should be timely.
8	Confirmation process	The confirmation process should ensure that preventive actions are adequate and appropriate corrective actions have been completed and are effective.
9	Administrative controls	Administrative controls should provide a formal review and approval process.
10	Operating experience	Operating experience involving the aging management program, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support a determination that the effects of aging will be adequately managed so that the structure and component intended functions will be maintained during the extended period of operation.

TABLE 2
STANDARD NOTES FOR LICENSE RENEWAL APPLICATION TABLES 3.X.2-Y

Note	Description
A	Consistent with NUREG-1801 [GALL Report] item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
E	Consistent with NUREG-1801 for material, environment, and aging effect, but a different aging management program is credited.
F	Material not in NUREG-1801 for this component.
G	Environment not in NUREG-1801 for this component and material.
H	Aging effect not in NUREG-1801 for this component, material and environment combination.
I	Aging effect in NUREG-1801 for this component, material and environment combination is not applicable.
J	Neither the component nor the material and environment combination is evaluated in NUREG-1801.

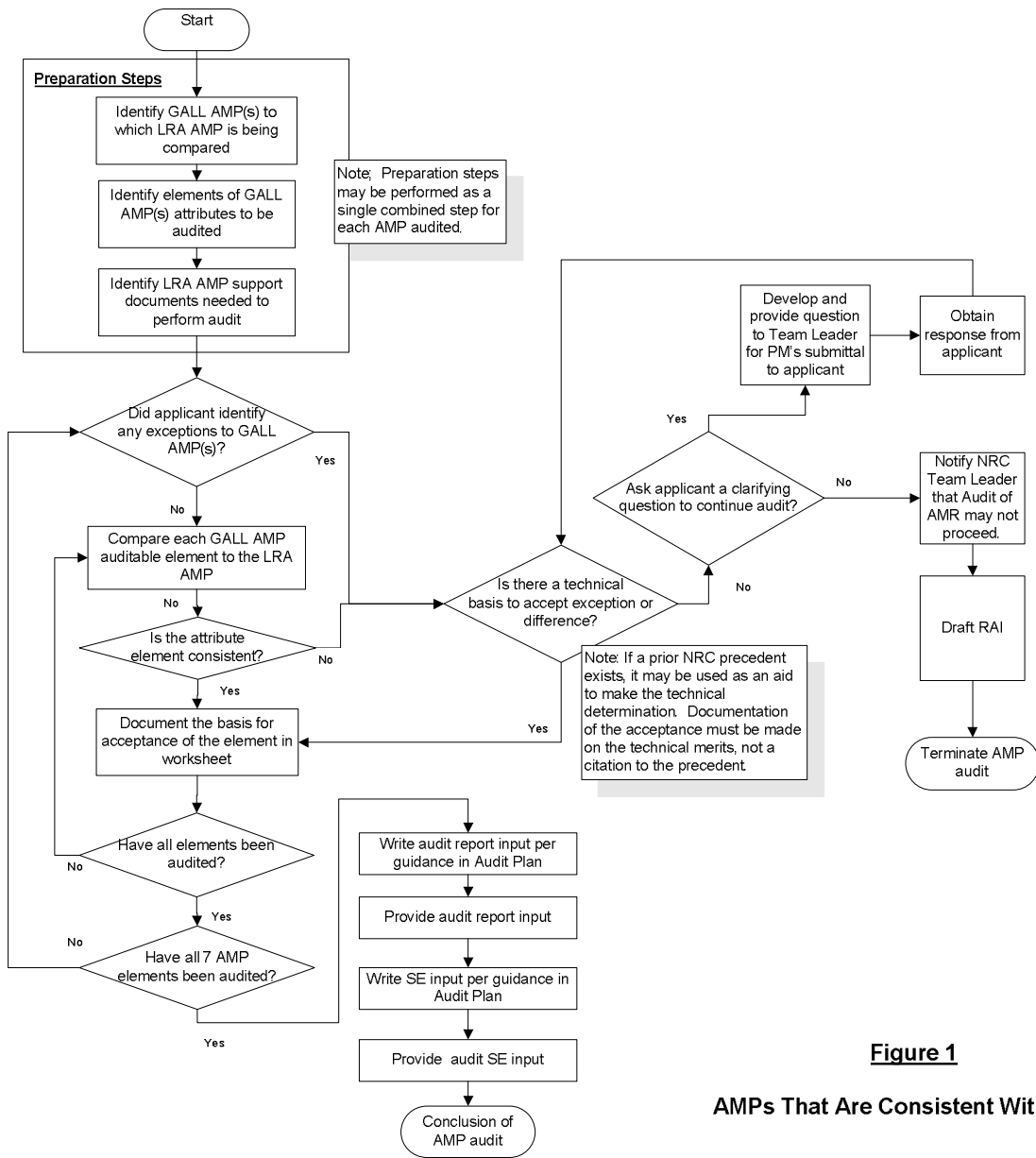


Figure 1

AMPs That Are Consistent With GALL

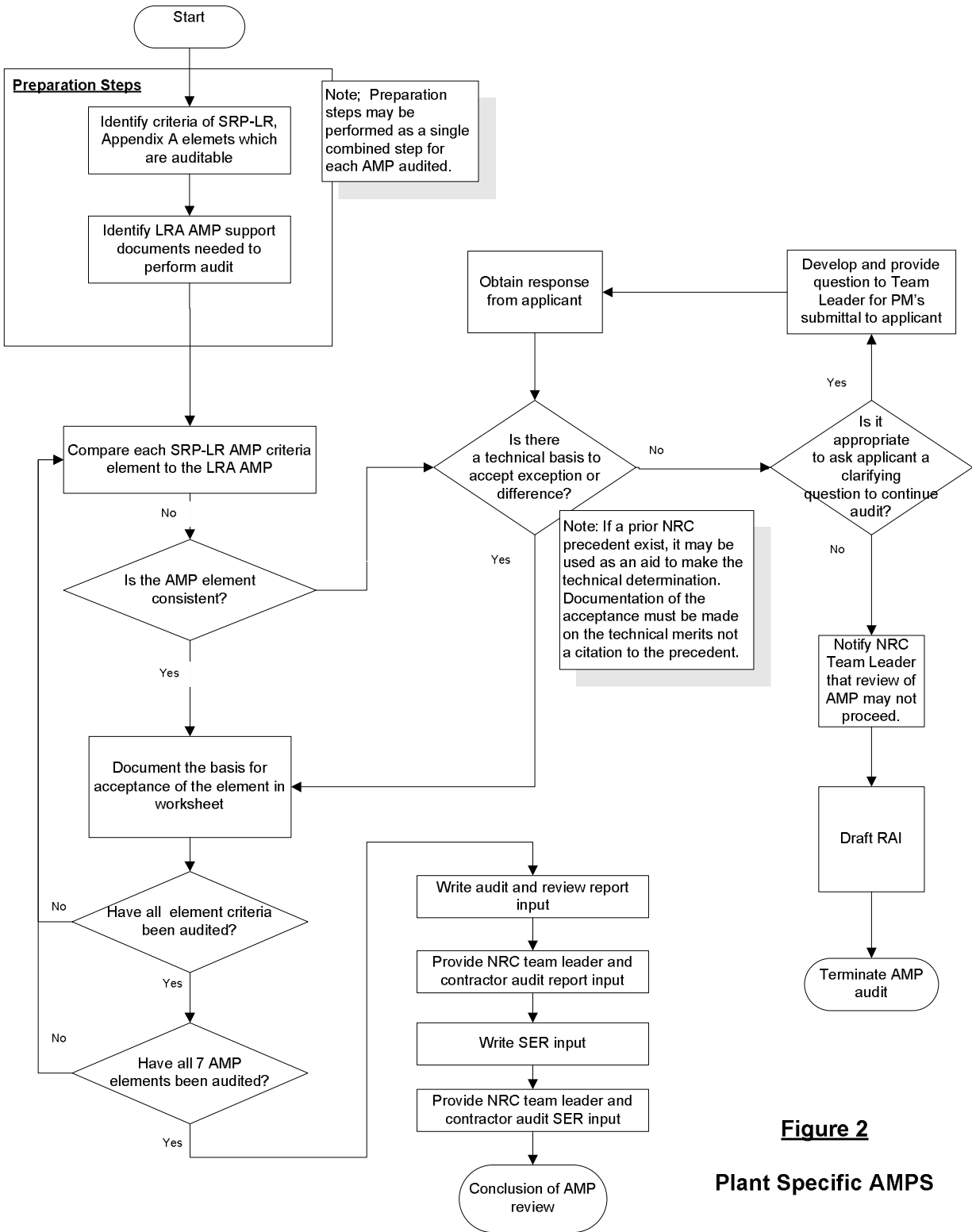
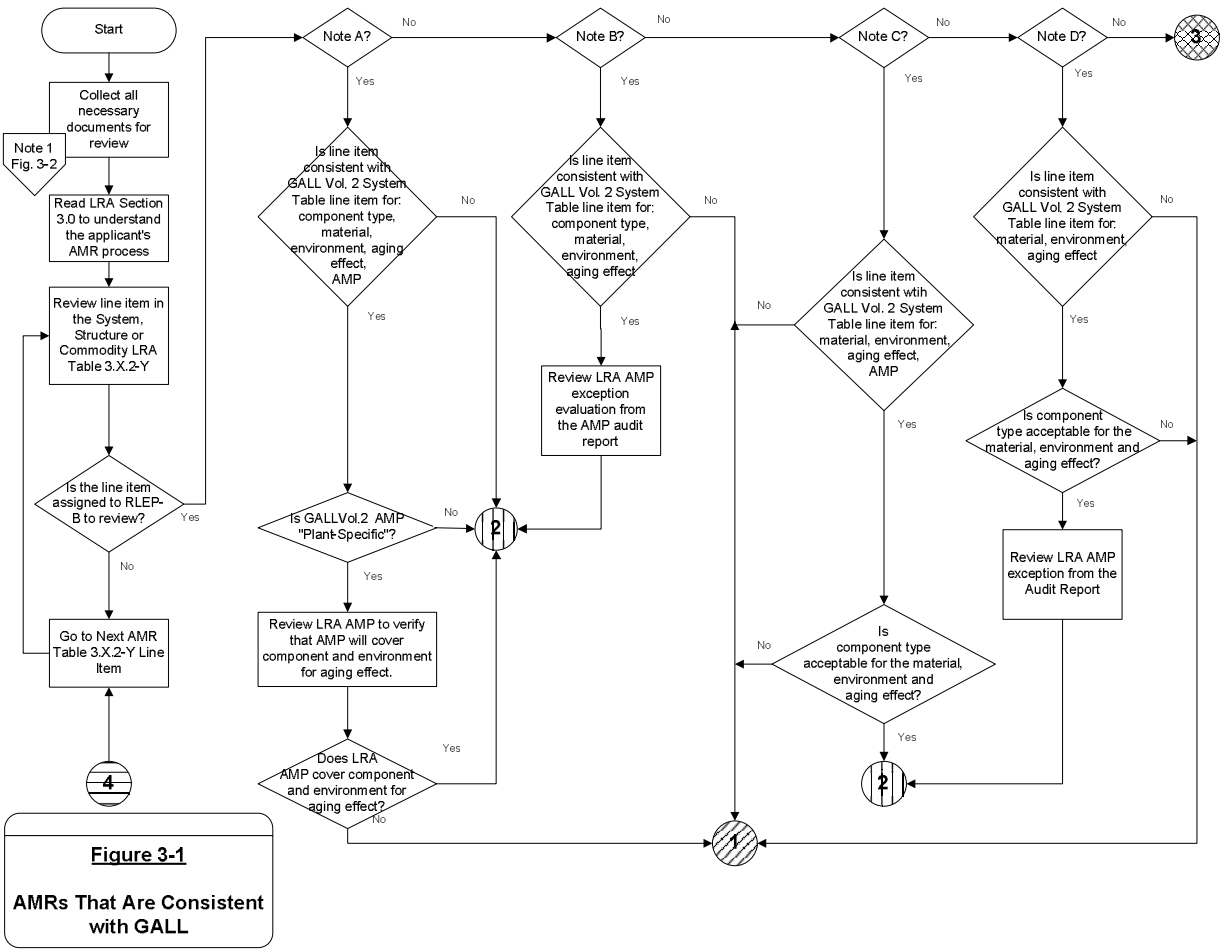
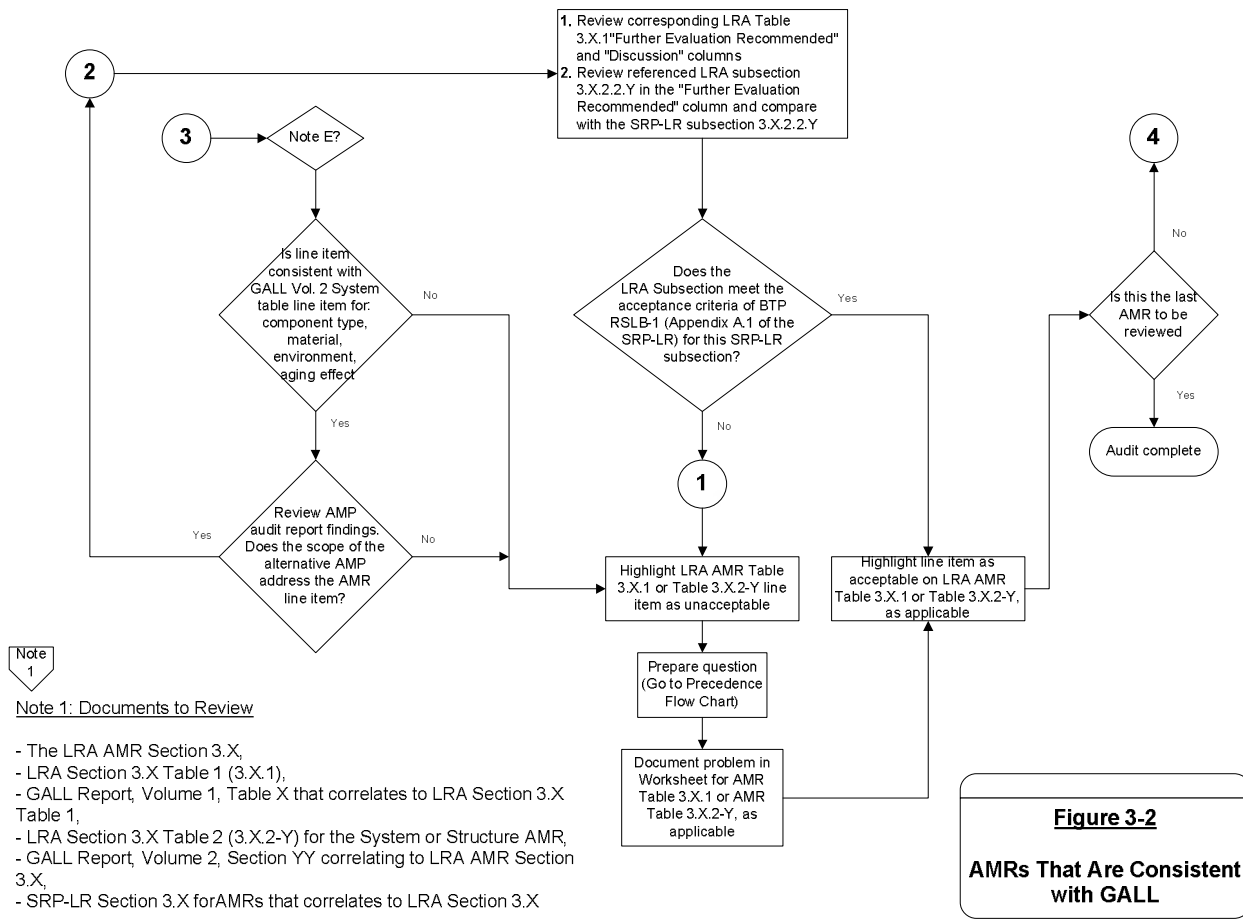


Figure 2
Plant Specific AMPs





APPENDIX A

PROJECT TEAM MEMBERS

Organization	Name	Function
NRC/NRR/DRIP/RLEP-B	G. Cranston	Team leader
NRC/NRR/DRIP/RLEP-B	N. Dudley	Backup team leader
NRC/NRR/DRIP/RLEP-B	T. Terry	Reviewer - Structures
NRC/NRR/DRIP/RLEP-B	L. Tran	Reviewer - Electrical
NRC/NRR/DE	D. Nguyen	Reviewer - Electrical
BNL	R. Morante	Contractor lead, Reviewer - Structures, Materials
BNL	M. Subudhi	Reviewer - Mechanical, Materials
BNL	R. Lofaro	Reviewer - Mechanical
BNL	K. Sullivan	Reviewer - Systems
BNL	E. Grove	Reviewer - Mechanical
BNL	C. Hofmayer	Reviewer - Structural

APPENDIX B

RLEP-B SCHEDULE FOR LRA SAFETY REVIEW

Plant: Brunswick Steam Electric Plant, Unit 1

Plant: Brunswick Steam Electric Plant, Unit 2

Project Team Leader: Gregory Cranston

Backup Project Team Leader: Noel Dudley

Project Manager: Sikhindra Mitra

Contractor: Brookhaven National Laboratory

Activity/Milestone		Scheduled Completion
1	Receive license renewal application	10/20/2004
2	Make review assignments (project manager)	11/05/2004
3	Train project team	N/A
4	Hold project team planning (kick-off) meeting	11/17-11/18/2004
5	Issue audit plan to project manager	12/13/2004
6	Conduct first site visit (AMP reviews)	01/10-01/14/2005
7	Draft AMP audit report input (team members)	01/27/2005
8	Draft SER input for AMP reviews (team members)	04/20/2005
9	Conduct in-office AMR reviews	01/31-02/04/2005
10	Conduct second site visit (resolve AMP and AMR questions)	02/07-02/11/2005
11	Draft AMR audit report input (team members)	02/28/2005
12	Draft SER input for AMR reviews (team members)	04/27/2005
13	Conduct third site visit (resolve outstanding issues and questions)	03/01-03/04/2005
14	Conduct public exit meeting	03/03/2005
15	Conduct writing session for audit report and SER input	N/A
16	Cutoff for providing RAls to project manger	03/01/2005
17	Final audit report (AMP and AMR sections)	04/14/2005
18	Final input for draft SER with open items	05/19/2005

APPENDIX C

AGING MANAGEMENT PROGRAM ASSIGNMENTS

BSEP LRA AMP Number	GALL Report AMP Number	Aging Management Program	Consistent W/ GALL?		Assigned Auditor
B.2.1	XI.M1	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program (Existing)	Yes		E. Grove
B.2.2	XI.M2	Water Chemistry Program (Existing)	Yes	Exceptions	M. Subudhi
B.2.3	XI.M3	Reactor Head Closure Studs Program (Existing)	Yes		M. Subudhi
B.2.4	XI.M7	BWR Stress Corrosion Cracking Program (Existing)	Yes		M. Subudhi
B.2.5	XI.M17	Flow-Accelerated Corrosion Program (Existing)	Yes	Exceptions Enhancements	N. Dudley
B.2.6	XI.M18	Bolting Integrity Program (Existing)	Yes	Exceptions Enhancements	M. Subudhi
B.2.7	XI.M20	Open Cycle Cooling Water System Program (Existing)	Yes	Enhancements	K. Sullivan
B.2.8	XI.M21	Closed Cycle Cooling Water System Program (Existing)	Yes	Enhancements	K. Sullivan
B.2.9	XI.M23	Inspection of Overhead Heavy Load and Light Load Handling Systems Program (Existing)	Yes	Enhancements	N. Dudley
B.2.10	XI.M26	Fire Protection Program (Existing).	Yes	Exceptions	K. Sullivan
B.2.11	XI.M27	Fire Water System Program (Existing)	Yes	Enhancements	K. Sullivan
B.2.12	XI.M29	Aboveground Carbon Steel Tanks Program (New)	Yes		T. Terry
B.2.13	XI.M30	Fuel Oil Chemistry Program (Existing)	Yes	Exceptions Enhancements	E. Grove
B.2.14	XI.M31	Reactor Vessel Surveillance Program (Existing)	Yes	Enhancements	DE
B.2.15	XI.M32	One-Time Inspection Program (New)	Yes	Exceptions Enhancements	E. Grove
B.2.16	XI.M33	Selective Leaching of Materials Program (New)	Yes	Exceptions (Robinson SER Precedent)	T. Terry
B.2.17	XI.M34	Buried Piping and Tanks Inspection Program (New)	Yes	Exceptions (Robinson SER Precedent)	T. Terry
B.2.18	XI.S1	ASME Section XI, Subsection IWE Program (Existing)	Yes		R. Morante

BSEP LRA AMP Number	GALL Report AMP Number	Aging Management Program	Consistent W/ GALL?		Assigned Auditor
			Yes	Exceptions	
B.2.19	XI.S2	ASME Section XI, Subsection IWL Program (Existing)	Yes	Exceptions	R. Morante
B.2.20	XI.S3	ASME Section XI, Subsection IWF Program (Existing)	Yes	Enhancements	R. Morante
B.2.21	XI.S4	10 CFR Part 50, Appendix J Program (Existing)	Yes		E. Grove
B.2.22	XI.S5	Masonry Wall Program (Existing)	Yes	Enhancements	T. Terry
B.2.23	XI.S6	Structures Monitoring Program (Existing)	Yes	Enhancements	R. Morante
B.2.24	XI.S8	Protective Coating Monitoring and Maintenance Program (Existing)	Yes	Exceptions Enhancements	N. Dudley
B.2.25	XI.E1	Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program (New)	Yes		D. Nguyen L. Tran
B.2.26	XI.E2	Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program (New)	Yes	Exceptions (Robinson SER Precedent)	D. Nguyen L. Tran
B.2.27	XI.E3	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program (New)	Yes		D. Nguyen L. Tran
B.2.28	Plant-Spec.	Reactor Vessel and Internals Structural Integrity Program (Existing)	N/A		DE
B.2.29	Plant-Spec.	Systems Monitoring Program (Existing)	N/A		DE
B.2.30	Plant-Spec.	Preventive Maintenance Program (Existing)	N/A	(Robinson SER Precedent)	N. Dudley
B.2.31	Plant-Spec.	Phase Bus Aging Management Program (New)	N/A	(Robinson SER Precedent)	DE
B.2.32	Plant-Spec.	Fuel Pool Girder Tendon Inspection Program (Existing)	N/A		DE
B.3.1	X.M1	Reactor Coolant Pressure Boundary Fatigue Monitoring Program (Existing) - TLAA	Yes	Exceptions Enhancements	R. Morante
B.3.2	X.E1	Environmental Qualification (EQ) Program (Existing) - TLAA	Yes		D. Nguyen L. Tran

APPENDIX D

AGING MANAGEMENT REVIEW ASSIGNMENTS

Aging Management Reviews	Reviewer
3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System	Subudhi
3.2 Aging Management of Engineered Safety Features	Subudhi
3.3 Aging Management of Auxiliary Systems	Lofaro
3.4 Aging Management of Steam and Power Conversion Systems	Dudley
3.5 Aging Management of Containment, Structures, and Component Supports	Morante Terry
3.6 Aging Management of Electrical and Instrumentation and Controls	Nguyen Tran

The BSEP work-split tables, which are mark-ups of the type 2 tables in the LRA, identify the scope and division of work between the DRIP/RLEP project team and DE. Due to the large amount of data, the BSEP work-split tables are provided in a separate document (ADAMS Accession No. MLxxxxxxxx).

The specific AMR line items to be reviewed by the project team are shown in the BSEP work-split tables. The project team will review all AMR line items that are NOT grayed out in the tables. The AMR line items that are grayed out will be evaluated by DE. The results of evaluations by DE will be reported in Section 3 of the BSEP SER.

APPENDIX E

CONSISTENT WITH GALL REPORT AMP AUDIT/REVIEW WORKSHEETS

The worksheets provided in this appendix are designed to assist the reviewer in documenting the basis for the assessment of the applicant's AMP program elements and sub-elements against the program elements of the GALL Report AMPs (Chapter XI of NUREG-1801, Volume 2). The worksheets provide a systematic method to record the basis for assessments and to identify where the applicant needs to provide clarification or additional information. Information recorded in the worksheets will be used to prepare the audit report and the safety evaluation report input.

Appendix E Table of Contents

LRA AMP: B.2.1 - ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program	E-2
LRA AMP: B.2.2 - Water Chemistry Program	E-9
LRA AMP: B.2.3 - Reactor Head Closure Studs Program	E-17
LRA AMP: B.2.4 - BWR Stress Corrosion Cracking Program	E-23
LRA AMP: B.2.5 - Flow-Accelerated Corrosion Program	E-30
LRA AMP: B.2.6 - Bolting Integrity Program	E-35
LRA AMP: B.2.7 - Open-Cycle Cooling Water System Program	E-42
LRA AMP: B.2.8 - Closed-Cycle Cooling Water System	E-48
LRA AMP: B.2.9 - Inspection of Overhead Heavy Load and Light Load Handling Systems Program	E-55
LRA AMP: B.2.10 - Fire Protection Program	E-60
LRA AMP: B.2.11 - Fire Water System Program	E-69
LRA AMP: B.2.12 - Aboveground Carbon Steel Tanks Program	E-76
LRA AMP: B.2.13 - Fuel Oil Chemistry Program	E-81
LRA AMP: B.2.15 - One-Time Inspection Program	E-87
LRA AMP: B.2.16 - Selective Leaching of Materials Program	E-93
LRA AMP: B.2.17 - Buried Piping And Tanks Inspection Program	E-98
LRA AMP: B.2.18 - ASME Section XI, Subsection IWE Program	E-104
LRA AMP: B.2.19 - ASME Section XI, Subsection IWL Program	E-111
LRA AMP: B.2.20 - ASME Section XI, Subsection IWF Program	E-119
LRA AMP: B.2.21 - 10 CFR Part 50, Appendix J Program	E-124
LRA AMP: B.2.22 - Masonry Wall Program	E-129
LRA AMP: B.2.23 - Structures Monitoring Program	E-135
LRA AMP: B.2.24 - Protective Coating Monitoring And Maintenance Program	E-142
LRA AMP: B.2.25 - Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	E-148
LRA AMP: B.2.26 - Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in I&C Circuits Program	E-153
LRA AMP: B.2.27 - Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements Program	E-158
LRA AMP: B.3.1 - Reactor Coolant Pressure Boundary Fatigue Monitoring Program	E-163
LRA AMP: B.3.2 - Environmental Qualification (EQ) Program	E-168

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.1 - ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD Program

REVIEWER: E. Grove

GALL AMP: XI.M1- ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The Code of Federal Regulations, 10 CFR 50.55a, imposes the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, for Class 1, 2, and 3 pressure-retaining components and their integral attachments in light-water cooled power plants. Inspection, repair, and replacement of these components are covered in Subsections IWB, IWC, and IWD, respectively, in the 1995 edition through the 1996 addenda. The program generally includes periodic visual, surface, and/or volumetric examination and leakage test of all Class 1, 2, and 3 pressure-retaining components and their integral attachments. The ASME Section XI inservice inspection program in accordance with Subsections IWB, IWC, or IWD has been shown to be generally effective in managing aging effects in Class 1, 2, or 3 components and their integral attachments in light-water cooled power plants. However, in certain cases, the ASME inservice inspection program is to be augmented to manage effects of aging for license renewal and is so identified in the GALL report.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	A The ASME Section XI program provides the requirements for ISI, repair, and replacement. The components within the scope of the program are specified in Subsections IWB-1100, IWC-1100, and IWD-1100 for Class 1, 2, and 3 components, respectively, and include all pressure-retaining components and their integral attachments in light-water cooled power plants.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The components described in Subsections IWB-1220, IWC-1220, and IWD-1220 are exempt from the examination requirements of Subsections IWB-2500, IWC-2500, and IWD-2500.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A The ASME Section XI does not provide guidance on methods to mitigate degradation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The ASME Section XI ISI program detects degradation of components by using the examination and inspection requirements specified in ASME Section XI Tables IWB-2500-1, IWC-2500-1, or IWD-2500-1, respectively, for Class 1, 2, or 3 components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A The extent and schedule of the inspection and test techniques prescribed by the program are designed to maintain structural integrity and ensure that aging effects will be discovered and repaired before the loss of intended function of the component.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Components are examined and tested as specified in Tables IWB-2500-1, IWC-2500-1, and IWD-2500-1, respectively, for Class 1, 2, and 3 components. The tables specify the extent and schedule of the inspection and examination methods for the components of the pressure-retaining boundaries. Alternative approved methods that meet the requirements of IWA-2240 are also specified in these tables.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C The program uses three types of examination: visual, surface, and volumetric in accordance with the general requirements of Subsection IWA-2000.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D For BWRs, the nondestructive examination (NDE) techniques appropriate for inspection of vessel internals and their implementation needs, including the uncertainties inherent in delivering and executing and NDE technique in a boiling water reactor (BWR), are included in the approved boiling water reactor vessel and internals project (BWRVIP)-03. Also, an applicant may use the guidelines of the approved BWRVIP-62 for inspection relief for vessel internal components with hydrogen water chemistry.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
5. Monitoring and Trending:	A For Class 1, 2, or 3 components, the inspection schedule of IWB-2400, IWC-2400, or IWD-2400, respectively, and the extent and frequency of IWB-2500-1, IWC-2500-1, or IWD-2500-1, respectively, provides for timely detection of degradation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B If flaw indications or relevant conditions of degradation are evaluated in accordance with IWB-3100 or IWC-3100, and the component is qualified as acceptable for continued service, the areas containing such flaw indications and relevant conditions are reexamined during the next three inspection periods of IWB-2410 for Class 1 components and for the next inspection period of IWC-2410 for Class 2 components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Examinations that reveal indications that exceed the acceptance standards described below are extended to include additional examinations in accordance with IWB-2430, IWC-2430, or IWD-2430 (1995 edition) for Class 1, 2, or 3 Components, respectively.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A Any indication or relevant conditions of degradation detected are evaluated in accordance with IWB-3000, IWC-3000, or IWD-3000, for Class 1, 2, or 3 components, respectively.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria	B Examination results are evaluated in accordance with IWB-3100 or IWC-3100 by comparing the results with the acceptance standards of IWB-3400 and IWB-3500 or IWC-3400 and IWC-3500, respectively, for Class 1 or Class 2 and 3 components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Flaws that exceed the size of allowable flaws, as defined in IWB-3500 or IWC-3500, are evaluated by using the analytical procedures of IWB-3600 or IWC-3600, respectively, for Class 1 or Class 2 and 3 components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D Approved BWRVIP-14, BWRVIP-59, and BWRVIP-60 documents provide guidelines for evaluation of crack growth steels, nickel alloys, and low-alloy steels, respectively.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A Because the ASME Code is a consensus document that has been widely used over a long period, it has been shown to be generally effective in managing aging effects in Class 1, 2, and 3 components and their integral attachments in light-water cooled power plants (see Chapter I of the GALL report, Vol. 2).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-7 -

Documents Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
2.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.2 - Water Chemistry Program

REVIEWER: M. Subudhi

GALL AMP: XI.M2 - Water Chemistry

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The main objective of this program is to mitigate damage caused by corrosion and stress corrosion cracking (SCC). The water chemistry program for boiling water reactors (BWRs) relies on monitoring and control of reactor water chemistry based on guidelines in the boiling water reactor vessel and internals project (BWRVIP)-29 (Electric Power Research Institute [EPRI] TR-103515). The BWRVIP-29 has three sets of guidelines: one for primary water, one for condensate and feedwater, and one for control rod drive (CRD) mechanism cooling water. The water chemistry program for pressurized water reactors (PWRs) relies on monitoring and control of reactor water chemistry based on the EPRI guidelines in TR-105714 for primary water chemistry and TR-102134 for secondary water chemistry. The water chemistry programs are generally effective in removing impurities from intermediate and high flow areas. The Generic Aging Lessons Learned (GALL) report identifies those circumstances in which the water chemistry program is to be augmented to manage the effects of aging for license renewal Accordingly, in certain cases as identified in the GALL report, verification of the effectiveness of the chemistry control program is undertaken to ensure that significant degradation is not occurring and the component intended function will be maintained during</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	the extended period of operation. As discussed in the GALL report for these specific cases, an acceptable verification program is a one-time inspection of selected components at susceptible locations in the system.	
1. Scope of Program:	A The program includes periodic monitoring and control of known detrimental contaminants such as chlorides, fluorides (PWRs only), dissolved oxygen, and sulfate concentrations below the levels known to result in loss of material or crack initiation and growth. Water chemistry control is in accordance with the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry in BWRs; EPRI TR-105714, Rev. 3 and PWRs; EPRI TR102134, Rev. 3, for primary water chemistry in PWRs; EPRI TR-102134, Rev. 3, for secondary water chemistry in PWRs; or later revisions or updates of these reports as approved by the staff.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A The program includes specifications for chemical species, sampling and analysis frequencies, and corrective actions for control of reactor water chemistry.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B System water chemistry is controlled to minimize contaminant concentration and mitigate loss of material due to general, crevice and pitting corrosion and crack initiation and growth caused by SCC.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
3. Parameters Monitored/Inspected:	<p>A The concentration of corrosive impurities listed in the EPRI guidelines discussed above, which include chlorides, fluorides (PWRs only), sulfates, dissolved oxygen, and hydrogen peroxide, are monitored to mitigate degradation of structural materials. Water quality (pH and conductivity) is also maintained in accordance with the guidance. Chemical species and water quality are monitored by in process methods or through sampling. The chemistry integrity of the samples is maintained and verified to ensure that the method of sampling and storage will not cause a change in the concentration of the chemical species in the samples.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B <i>BWR Water Chemistry:</i> The guidelines in BWRVIP-29 (EPRI TR-103515) for BWR reactor water recommend that the concentration of chlorides, sulfates, and dissolved oxygen are monitored and kept below the recommended levels to mitigate corrosion. The two impurities, chlorides and sulfates, determine the coolant conductivity; dissolved oxygen, hydrogen peroxide, and hydrogen determine electrochemical potential (ECP). The EPRI guidelines recommend that the coolant conductivity and ECP are also monitored and kept below the recommended levels to mitigate SCC and corrosion in BWR plants. The EPRI guidelines in BWRVIP-29 (TR-103515) for BWR feedwater, condensate, and control rod drive water recommends that conductivity, dissolved oxygen level, and concentrations of iron and copper (feedwater only) are monitored and kept below the recommended levels to mitigate SCC. The EPRI guidelines in BWRVIP-29 (TR-103515) also include recommendations for controlling water chemistry in auxiliary systems: torus/pressure suppression chamber, condensate storage tank, and spent fuel pool.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C <i>PWR Primary Water Chemistry:</i> The EPRI guidelines (EPRI TR-105714) for PWR primary water chemistry recommend that the concentration of chlorides, fluorides, sulfates, lithium, and dissolved oxygen and hydrogen are monitored and kept below the recommended levels to mitigate SCC of austenitic stainless steel, Alloy 600, and Alloy 690 components. TR-105714 provides guidelines for chemistry control in PWR auxiliary systems such as boric acid storage tank, refueling water storage tank, spent fuel pool, letdown purification systems, and volume control tank.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D <i>PWR Secondary Water Chemistry:</i> The EPRI guidelines (EPRI TR-102134) for PWR secondary water chemistry recommend monitoring and control of chemistry parameters (e.g., pH level, cation conductivity, sodium, chloride, sulfate, lead, dissolved oxygen, iron, copper, and hydrazine) to mitigate steam generator tube degradation caused by denting, intergranular attack (IGA), outer diameter stress corrosion cracking (ODSCC), or crevice and pitting corrosion. The monitoring and control of these parameters, especially the pH level, also mitigates general (carbon steel components), crevice, and pitting corrosion of the steam generator shell and the balance of plant materials of construction (e.g., carbon steel, stainless steel, and copper).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A This is a mitigation program and does not provide for detection of any aging effects, such as loss of material and crack initiation and growth.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
5. Monitoring and Trending:	A The frequency of sampling water chemistry varies (e.g., continuous, daily, weekly, or as needed) based on plant operating conditions and the EPRI water chemistry guidelines.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A Maximum levels for various contaminants are maintained below the system specific limits as indicated by the limits specified in the corresponding EPRI water chemistry guidelines. Any evidence of the presence of aging effects or unacceptable water chemistry results is evaluated, the root cause identified, and the condition corrected.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Any evidence of the presence of aging effects or unacceptable water chemistry results is evaluated, the root cause identified, and the condition corrected.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A <i>BWR</i> : Intergranular stress corrosion cracking (IGSCC) has occurred in small- and large-diameter BWR piping made of austenitic stainless steels and nickel-base alloys. Significant cracking has occurred in recirculation, core spray, residual heat removal (RHR) systems, and reactor water cleanup (RWCU) system piping welds. IGSCC has also occurred in a number of vessel internal components, including core shroud, access hole cover, top guide, and core spray	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>spargers (Nuclear Regulatory Commission [NRC] Information Bulletin 80-13, NRC Information Notice [IN] 95-17, NRC General Letter [GL] 94-03, and NUREG-1544). No occurrence control systems exposed to sodium pentaborate solution has ever been reported (NUREG/CR-6001).</p> <p>B <i>PWR Primary System:</i> The primary pressure boundary piping of PWRs has generally not been found to be affected by SCC because of low dissolved oxygen levels and control of primary water chemistry. However, the potential for SCC exists due to inadvertent introduction of contaminants into the primary coolant system from unacceptable levels of contaminants in the boric acid; introduction through the free surface of the spent fuel pool, which can be a natural collector of airborne contaminants; or introduction of oxygen during cooldown (NRC IN 84-18). Ingress of demineralizer resins into the primary system has caused IGSCC of Alloy 600 vessel head penetrations (NRC IN 96-11, NRC GL 97-01). Inadvertent introduction of sodium thiosulfate into the primary system has caused IGSCC of steam generator tubes. The SCC has occurred in safety injection lines (NRC INs 97-19 and 84-18), charging pump casing cladding (NRC INs 80-38 and 94-63), instrument nozzles in safety injection tanks (NRC IN 91-05), and safety-related SS piping systems that contain oxygenated, stagnant, or essentially stagnant boric acid (NRC IN 97-19). Steam generator tubes and plugs and Alloy 600 penetrations have experienced primary water stress corrosion cracking (PWSCC) (NRC INs 89-33, 94-87, 97-88, 90-10, and 96-11; NRC Bulletin 89-01 and its two supplements).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	C <i>PWR Secondary System</i> : Steam generator tubes have experienced ODSCC, IGA, wastage, and pitting (NRC IN 97-88, NRC GL 95-05). Carbon steel support plates in steam generators have experienced general corrosion. The steam generator shell has experienced pitting and stress corrosion cracking (NRC INs 82-37, 85-65, and 90-04).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-15-

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.3 - Reactor Head Closure Studs Program

REVIEWER: M. Subudhi

GALL AMP: XI.M3 - Reactor Head Closure Studs

DATE: 01/10-01/14/2005

E-17 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A This program includes inservice inspection (ISI) in conformance with the requirements of the American Society of Mechanical Engineers (ASME), Code, Section XI, Subsection IWB (1995 edition through the 1996 addenda), Table IWB 2500-1	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The program includes preventive measures to mitigate cracking	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
1. Scope of Program:	A ISI to detect crack initiation and growth due to stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC); loss of material due to wear; and coolant leakage from reactor vessel closure stud bolting for both boiling water reactors (BWRs) and pressurized water reactors (PWRs)	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B preventive measures of NRC Regulatory Guide 1.65 to mitigate cracking</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C The program is applicable to closure studs and nuts constructed from materials with a maximum tensile strength limited to less than 1,172 MPa (170 ksi) (Nuclear Regulatory Commission [NRC] Regulatory Guide [RG] 1.65).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A preventive measures include avoiding the use of metal-plated stud bolting to prevent degradation due to corrosion or hydrogen embrittlement</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B to use manganese phosphate or other acceptable surface treatments and stable lubricants (RG 1.65).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A The ASME Section XI ISI program detects and sizes cracks, detects loss of material, and detects coolant leakage by following the examination and inspection requirements specified in Table IWB-2500-1.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A The extent and schedule of the inspection and test techniques prescribed by the program are designed to maintain structural integrity and ensure that aging effects will be discovered and repaired before the loss of intended function of the component. Inspection can reveal crack initiation and growth, loss of material due to corrosion or wear, and leakage of coolant.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The program uses visual, surface, and volumetric examinations in accordance with the general requirements of Subsection IWA-2000.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Components are examined and tested as specified in Table IWB-2500-1.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D Examination category B-G-1, for pressure-retaining bolting greater than 2 in. in diameter in reactor vessels specifies volumetric examination of studs in place, from the top of the nut to the bottom of the flange hole, and surface and volumetric examination of studs when removed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>E Also specified are volumetric examination of flange threads and visual VT-1 examination of surfaces of nuts, washers, and bushings</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>F Examination category B-P for all pressure-retaining components specifies visual VT-2 examination of all pressure-retaining boundary components during the system leakage test and the system hydrostatic test.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A The Inspection schedule of IWB-2400, and the extent and frequency of IWB-2500-1 provide timely detection of cracks, loss of material, and leakage.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A Any indication or relevant condition of degradation in closure stud bolting is evaluated in accordance with IWB-3100 by comparing ISI results with the acceptance standards of IWB-3400 and IWB-3500.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A The SCC has occurred in BWR pressure vessel head studs (Stoller 1991). The aging management program (AMP) has provisions regarding inspection techniques and evaluation, material specifications, corrosion prevention, and other aspects of reactor pressure vessel head stud cracking. Implementation of the program provides reasonable assurance that the effects of cracking due to SCC or IGSCC and loss of material due to wear will be adequately managed so that the intended functions of the reactor head closure studs and bolts will be maintained consistent with the current licensing basis	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

E-21 -

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
2.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.4 - BWR Stress Corrosion Cracking Program

REVIEWER: M. Subudhi

GALL AMP: XI.M7 - BWR Stress Corrosion Cracking

DATE: 01/10-01/14/2005

E-23 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A manage intergranular stress corrosion cracking (IGSCC) in boiling water reactor (BWR) coolant pressure boundary piping made of stainless steel (SS) is delineated in NUREG-0313, Rev. 2, and Nuclear Regulatory Commission (NRC) Generic Letter (GL) 88-01 and its Supplement 1.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B preventive measures to mitigate IGSCC system modifications and maintenance programs to mitigate cracking.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C inspection and flaw evaluation	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D The staff-approved boiling water reactor vessel and internals project (BWRVIP)-75 report allows for modifications of inspection scope in the GL 88-01 program.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Scope of Program:</p>	<p>A managing and implementing countermeasures to mitigate IGSCC.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B performing inservice inspection (ISI) to monitor IGSCC and its effects on the intended function of BWR components.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C The program is applicable to all BWR piping made of austenitic SS that is 4 in. or larger in nominal diameter and contains reactor coolant at a temperature above 93°C (200°F) during power operation, regardless of code classification. The program also applies to pump casings, valve bodies and reactor vessel attachments and appurtenances, such as head spray and vent components.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D NUREG-0313 and NRC GL-88-01, respectively, describe the technical basis and staff guidance regarding mitigation of IGSCC in BWRs.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>E Attachment A of NRC GL 88-01 delineates the staff approved positions regarding materials, processes, water chemistry, weld overlay reinforcement, partial replacement, stress improvement of cracked welds, clamping devices, crack characterization and repair criteria, inspection methods and personnel, inspection schedules, sample expansion, leakage detection, and reporting requirements.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A The program delineated in NUREG-0313 and NRC GL 88-01 and in the staff-approved BWRVIP-75 report includes recommendations regarding selection of materials that are resistant to sensitization, use of special processes that reduce residual tensile stresses, and monitoring and maintenance of coolant chemistry.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B The resistant materials are used for new and replacement components and include low-carbon grades of austenitic SS and weld metal, with a maximum carbon of 0.035 wt.% and a minimum ferrite of 7.5% in weld metal and cast austenitic stainless steel (CASS). Inconel 82 is the only commonly used nickel-base weld metal considered to be resistant to SCC; other nickel-alloys, such as Alloy 600 are evaluated on an individual basis.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Special processes are used for existing, new, and replacement components. These processes include solution heat treatment, heat sink, welding, induction heating, and mechanical stress improvement.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D Maintaining high water purity reduces susceptibility to SCC or IGSCC. Reactor coolant water chemistry is monitored and maintained in accordance with the guidelines in BWRVIP-29 (Electric Power Research Institute [EPRI] TR-103515).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A The program detects and sizes cracks and detects leakage by using the examination and inspection guidelines delineated in NUREG 0313, Rev. 2, and NRC GL 88-01 or the referenced BWRVIP-75 guideline as approved by the NRC staff.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A The program uses volumetric examinations to detect IGSCC.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B The NRC GL 88-01 recommends that the detailed inspection procedure, equipment, and examination personnel be qualified by a formal program approved by the NRC. These inspection guidelines, updated in the approved BWRVIP-75 document, provide the technical basis for revisions to NRC GL 88-01 inspection schedules.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C The extent and frequency of inspection recommended by the program are based on the condition of each weld (e.g., whether the weldments were made from IGSCC-resistant material, whether a stress improvement process was applied to a weldment to reduce residual stresses, and how the weld was repaired if it had been cracked).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D The inspection guidance in approved BWRVIP-75 replaces the extent and schedule of inspection in NRC GL 88-01.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Based on inspection results, NRC GL 88-01 or approved BWRVIP-75 guidelines provide guidelines for additional samples of welds to be inspected when one or more cracked welds are found in a weld category.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A As recommended in NRC GL 88-01, any indication detected is evaluated in accordance with the ASME Section XI, Subsection IWB-3640 (1995 edition through the 1996 addenda) and the guidelines of NUREG-0313.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Applicable and approved BWRVIP-14, BWRVIP-59, and BWRVIP-62 documents provide guidelines for evaluation of crack growth in SSs, nickel alloys, and low alloy steels. An applicant may use BWRVIP-61 guidelines for BWR vessel and internal induction heating stress improvement effectiveness on crack growth in operating plants.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Intergranular stress corrosion cracking has occurred in small- and large-diameter BWR piping made of austenitic stainless steel and nickel-base alloys. Cracking has occurred in recirculation, core spray, residual heat removal (RHR), and reactor water cleanup (RWCU) system piping welds (NRC GL 88-01, NRC Information Notices [INs] 82-39 and 84-41). The comprehensive program outlined in NRC GL 88-01 and NUREG-0313 and in the staff-approved BWRVIP-75 report addresses mitigating measures for SCC or IGSCC (e.g., susceptible material, significant tensile stress, and an aggressive environment). The GL 88-01 program has been effective in managing IGSCC in BWR reactor coolant pressure-retaining components and the revision to the GL 88-01 program, according to the staff-approved BWRVIP-75 report, will adequately manage IGSCC degradation.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

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Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.5 - Flow-Accelerated Corrosion Program

REVIEWER: N. Dudley

GALL AMP: XI.M17 - Flow-Accelerated Corrosion

DATE: 01/10-01/14/2005

E-30 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	The program relies on implementation of the Electric Power Research Institute (EPRI) guidelines in the Nuclear Safety Analysis Center (NSAC)-202L-R2 for an effective flow-accelerated corrosion (FAC) program. The program includes performing (a) B an analysis to determine critical locations, (b) C limited baseline inspections to determine the extent of thinning at these locations, and (c) D follow-up inspections to confirm the predictions, or repairing or replacing components as necessary.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
1. Scope of Program:	A The FAC program, described by the EPRI guidelines in NSAC-202L-R2, includes procedures or administrative controls to assure that the structural integrity of all carbon steel lines containing high-energy fluids (two phase as well as single phase) is maintained.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Valve bodies retaining pressure in these high-energy systems are also covered by the program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C A program implemented in accordance with the EPRI guidelines predicts, detects, and monitors FAC in plant piping and other components, such as valve bodies, elbows and expanders. Such a program includes the following recommendations:</p> <p>(a) conducting an analysis to determine critical locations; (b) performing limited baseline inspections to determine the extent of thinning at these locations; and (c) performing follow-up inspections to confirm the predictions, or repairing or replacing components as necessary.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>2. Preventive Actions:</p>	<p>A The FAC program is an analysis, inspection, and verification program; thus, there is no preventive action.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A The aging management program (AMP) monitors the effects of FAC on the intended function of piping and components by measuring wall thickness.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A Degradation of piping and components occurs by wall thinning. The inspection program delineated in NSAC-202L consists of identification of susceptible locations as indicated by operating conditions or special considerations.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Ultrasonic and radiographic testing is used to detect wall thinning. The extent and schedule of the inspections assure detection of wall thinning before the loss of intended function</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A CHECWORKS or a similar predictive code is used to predict component degradation in the systems conducive to FAC, as indicated by specific plant data, including material, hydrodynamic, and operating conditions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B The inspection schedule developed by the licensee on the basis of the results of such a predictive code provides reasonable assurance that structural integrity will be maintained between inspections.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>C If calculations indicate that an area will reach the minimum allowed thickness before the next scheduled outage, the component is to be replaced, or reevaluated</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A Inspection results are used as input to a predictive computer code, such as CHECWORKS, to calculate the number of refueling or operating cycles remaining before the component reaches the minimum allowable wall thickness.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	B If calculations indicate that an area will reach the minimum allowed thickness before the next schedule outage, the component is to be repaired, replaced, or reevaluated.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A Wall-thinning problems in single-phase systems have occurred in feedwater and condensate systems (NRC IE Bulletin No. 87-01; NRC Information Notices [INs] 81-28, 92-35, 95-11) and in two-phase piping in extraction steam lines (NRC INs 89-53, 97-84) and moisture separation reheater and feedwater heater drains (NRC INs 89-53, 91-18, 93-21, 97-84). Operating experience shows that the present program, when properly implemented, is effective in managing FAC in high-energy carbon steel piping and components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

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Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.6 - Bolting Integrity Program

REVIEWER: M. Subudhi

GALL AMP: XI.M18 - Bolting Integrity

DATE: 01/10-01/14/2005

E-35 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The program relies recommendations for a comprehensive bolting integrity program, as delineated in NUREG-1339, and industry recommendations, as delineated in the Electric Power Research Institute (EPRI) NP-5769, with the exceptions noted in NUREG-1339 for safety related bolting. The program relies on industry recommendations for a comprehensive bolting maintenance, as delineated in the EPRI TR-104213 for pressure retaining bolting and structural bolting.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The program relies on industry recommendations for a comprehensive bolting maintenance, as delineated in the EPRI TR-104213 for pressure retaining bolting and structural bolting.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C The program generally includes periodic inspection of closure bolting for indication of loss of preload, cracking, and loss of material due to corrosion rust, etc.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	A The program covers all bolting within the scope of license renewal including safety-related bolting, bolting for NSSS component supports, bolting for other pressure retaining components, and structural bolting. The program covers both greater than and smaller than 2-in. diameter bolting.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The Nuclear Regulatory Commission (NRC) staff recommendations and guidelines for comprehensive bolting 'integrity programs that encompass all safety-related bolting are delineated in NUREG-1339	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A Selection of bolting material and the use of lubricants and sealants is in accordance with the guidelines of EPRI NP-5769 and the additional recommendations of NUREG-1339 to prevent or mitigate degradation and failure of safety-related bolting (see item 10, below). (NUREG-1339 takes exception to certain items in EPRI NP-5769, and recommends additional measures with regard to them.)	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Initial ISI of bolting for pressure retaining components includes a check of the bolt torque and uniformity of the gasket compression after assembly. It is noted that hot torquing of bolting is a leak preventive measure once the joint is brought to operating temperature and before or after it is pressurized. Hot torquing thus reestablishes preload before leak starts, but is ineffective in sealing a leak once it has begun.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
3. Parameters Monitored/Inspected:	A The aging management program (AMP) monitors the effects of aging on the intended function of closure bolting, including loss of material, cracking, and loss of preload.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B High strength bolts (actual yield strength \geq 150 ksi) used in NSSS component supports are monitored for cracking.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Bolting for pressure retaining components is inspected for signs of leakage.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D Structural bolting is inspected for indication of potential problems including loss of coating integrity and obvious signs of corrosion, rust, ect.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A Inspection requirements are in accordance with the American Society of Mechanical Engineers (ASME) Section XI, Table IWB 2500-1 or IWC 2500-1 (1995 edition through the 1996 addenda) and the recommendations of EPRI NP-5769.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The extent and schedule of inspections, in accordance with IWB 2500-1 or IWC 2500-1, assure detection of aging degradation before the loss of the intended function of the closure bolting.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A The inspection schedules of ASME Section XI are effective and ensure timely detection of cracks and leakage.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B If bolting for pressure retaining components (not covered by ASME Section XI) is reported to be leaking, then it may be inspected daily. If the leak rate does not increase, the inspection frequency may be decreased to weekly or biweekly.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	A Any indications in closure bolting are evaluated in accordance with IWB-3100 and acceptance standards of IWB-3400 and IWB-3500, or IWC-3100 and acceptance standards of IWC-3400 and IWC-3500.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Indications of cracking in component support bolting warrant immediate replacement of the cracked bolt.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C For other pressure retaining components, a leak from a joint is immediately repaired if it is a major leak and causes adverse effect such as corrosion or contamination.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Degradation of threaded fasteners in closures for the reactor coolant pressure boundary has occurred from boric acid corrosion, stress corrosion cracking, and fatigue loading (NRC IE Bulletin 82-02, NRC Generic Letter [GL] 91-17). Stress corrosion cracking has occurred in high strength bolts used for NSSS component supports. The bolting integrity programs developed and implemented in accordance with commitments made in response to NRC communications on bolting events have provided an effective means of ensuring bolting reliability. These programs are documented in EPRI NP-5769 and TR-104213 and represent industry consensus.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

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Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET

GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.7 - Open-Cycle Cooling Water System Program

REVIEWER: K. Sullivan

GALL AMP: XI.M20 - Open-Cycle Cooling Water System

DATE: 01/10-01/14/2005

E-42 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The program relies on implementation of the recommendations of the Nuclear Regulatory Commission (NRC) Generic Letter (GL) 89-13 to ensure that the effects of aging on the open-cycle cooling water (OCCW) (or service water) system will be managed for the extended period of operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B The program includes surveillance and control techniques to manage aging effects caused by biofouling, corrosion, erosion, protective coating failures, and silting in the OCCW system or structures and components serviced by the OCCW system.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Scope of Program:</p>	<p>A The program addresses the aging effects of material loss and fouling due to micro- or macro-organisms and various corrosion mechanisms.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Because the characteristics of the service water system may be specific to each facility, the OCCW system is defined as a system or systems that transfer heat from safety-related systems, structures, and components (SSC) to the ultimate heat sink (UHS). If an intermediate system is used between the safety-related SSCs and the system rejecting heat to the UHS, that intermediate system performs the function of a service water system and is thus included in the scope of recommendations of NRC GL 89-13.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C The guidelines of NRC GL 89-13 include (a) surveillance and control of biofouling;(b) a test program to verify heat transfer capabilities; (c) routine inspection and a maintenance program to ensure that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of safety-related systems serviced by OCCW; (d) a system walkdown inspection to ensure compliance with the licensing basis; and (e) a review of maintenance, operating, and training practices and procedures.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A Implementation of NRC GL 89-13 includes a condition and performance monitoring program; control or preventive measures, such as chemical treatment, whenever the potential for biological fouling species exists; or flushing of infrequently used systems.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A Cleanliness and material integrity of piping, components, heat exchangers, and their internal linings or coatings (when applicable) that are part of the OCCW system or that are cooled by the OCCW system are periodically inspected, monitored, or tested to ensure heat transfer capabilities.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B The program ensures (a) removal of accumulations of biofouling agents, corrosion products, and silt, and (b) detection of defective protective coatings and corroded OCCW system piping and components that could adversely affect performance of their intended safety functions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A Inspections for biofouling, damaged coatings, and degraded material condition are conducted. Visual inspections are typically performed; however, nondestructive testing, such as ultrasonic testing, eddy current testing, and heat transfer capability testing, are effective methods to measure surface condition and the extent of wall thinning associated with the service water system piping and components, when determined necessary.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Inspection scope, method (e.g., visual or nondestructive examination [NDE]), and testing frequencies are in accordance with the utility commitments under NRC GL 89-13.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Testing and inspections are done annually and during refueling outages</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Inspections or nondestructive testing will determine the extent of biofouling, the condition of the surface coating, the magnitude of localized pitting, and the amount of MIC, if applicable.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D Heat transfer testing results are documented in plant test procedures and are trended and reviewed by the appropriate group.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
6. Acceptance Criteria:	<p>A Biofouling is removed or reduced as part of the surveillance and control process.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Acceptance criteria are based on effective cleaning of biological fouling organisms and maintenance of protective coating or linings are emphasized.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Significant microbiologically influenced corrosion (NRC Information Notice [IN] 85-30), failure of protective coatings (NRC IN 85-24), and fouling (NRC IN 81-21, IN 86-96) have been observed in a number of heat exchangers. The guidance of NRC GL 89-13 has been implemented for approximately 10 years and has been effective in managing aging effects due to biofouling, corrosion, erosion, protective coating failures, and sitting in structures and components serviced by OCCW systems.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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E-46 -

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.8 - Closed-Cycle Cooling Water System

REVIEWER: K. Sullivan

GALL AMP: XI.M21 - Closed-Cycle Cooling Water System

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The program includes (a) preventive measures to minimize corrosion and (b) surveillance testing and inspection to monitor the effects of corrosion <u>on the intended function</u> of the component.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The program relies on maintenance of system corrosion inhibitor concentrations within specified limits of Electric Power Research Institute [EPRI] TR-107396 to minimize corrosion.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Surveillance testing and inspection in accordance with standards in EPRI TR-107396 for closed-cycle cooling water (CCCW) systems is performed to evaluate system and component performance.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	A A CCCW system is defined as part of the service water system that is not subject to significant sources of contamination, in which water chemistry is controlled and in which heat is not directly rejected to a heat sink. The program described in this section applies only to such a system. If one or more of these conditions are not satisfied, the system is to be considered an open-cycle cooling water system. The staff notes that If the adequacy of cooling water chemistry control can not be confirmed, the system is treated as an open-cycle system as indicated in Action III of Generic Letter (GL) 89-13.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A The program relies on the maintenance of system corrosion inhibitor concentrations within specified limits of EPRI TR-107396	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The program includes monitoring and control of cooling water chemistry to minimize exposure to aggressive environments	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C application of corrosion inhibitor in the CCCW system to mitigate general, crevice, and pitting corrosion.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
3. Parameters Monitored/Inspected:	A surveillance testing and inspection in accordance with standards in EPRI TR-107396 to evaluate system and component performance.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B For pumps, the parameters monitored include flow and discharge and suction pressures.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C For heat exchangers, the parameters monitored include flow, inlet and outlet temperatures, and differential pressure.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A The extent and schedule of inspections and testing in accordance with EPRI TR-107396	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Performance and functional testing in accordance with EPRI TR-107396	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C For systems and components in continuous operation, performance adequacy is determined by monitoring data trends for evaluation of heat transfer fouling, pump wear characteristics, and branch flow changes.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D Components not in operation are periodically tested to ensure operability</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
5. Monitoring and Trending:	<p>A Frequency of sampling water chemistry varies and can occur on a continuous, daily, weekly, or as needed basis, as indicated by plant operating conditions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Per EPRI TR-107396, performance and functional tests are performed at least every 18 months to demonstrate system operability</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C tests to evaluate heat removal capability of the system and degradation of system components are performed every five years . The testing intervals may be adjusted on the basis of the results of the reliability analysis, type of service, frequency of operation, or age of components and systems.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D The testing intervals may be adjusted on the basis of the results of the reliability analysis, type of service, frequency of operation, or age of components and systems.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A Corrosion inhibitor concentrations are maintained within the limits specified in the EPRI water chemistry guidelines for CCCW.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B System and component performance test results are evaluated in accordance with the guidelines of EPRI TR-107396.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Acceptance criteria and tolerances are also based on system design parameters and functions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Degradation of closed-cycle cooling water systems due to corrosion product buildup (NRC Licensee Event Report [LER] 93-029-00) or through-wall cracks in supply lines (NRC LER 91-019-00) has been observed in operating plants. Accordingly, operating experience demonstrates the need for this program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-53 -

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
2.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.9 - Inspection of Overhead Heavy Load and Light Load Handling Systems Program

REVIEWER: N. Dudley

GALL AMP: XI.M23 - Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The program demonstrates that testing and monitoring programs have been implemented and have ensured that the structures, systems, and components of these cranes are capable of sustaining their rated loads. This is their intended function during the period of extended operation. It is noted that many of the systems and components of these cranes perform an intended function with moving parts or with a change in configuration, or subject to replacement based on qualified life. In these instances, these types of crane systems and components are not within the scope of this aging management program (AMP). This program is primarily concerned with structural components that make up the bridge and trolley. NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," provides specific guidance on the control of overhead heavy load cranes.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	A The program manages the effects of general corrosion on the crane and trolley structural components for those cranes that are within the scope of 10 CFR 54.4, and the effects of wear on the rails in the rail system.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
2. Preventive Actions:	A No preventive actions are identified. The crane program is an inspection program.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
3. Parameters Monitored/Inspected:	A The program evaluates the effectiveness of the maintenance monitoring program and the effects of past and future usage on the structural reliability of cranes.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	B The number and magnitude of lifts made by the crane are also reviewed.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
4. Detection of Aging Effects:	A Crane rails and structural components are visually inspected on a routine basis for degradation.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	B Functional tests are also performed to assure their integrity.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
5. Monitoring and Trending:	A Monitoring and trending are not required as part of the crane inspection program.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
6. Acceptance Criteria:	A Any significant visual indication of loss of material due to corrosion or wear are evaluated according to applicable industry standards and good industry practice.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	B The crane may also have been designed to a specific Service Class as defined in the EOCI Specification #61 (or later revisions), or CMAA Specification #70 (or later revisions), or CMAA Specification #74 (or later revisions). The specification that was applicable at the time the crane was manufactured is used.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A Because of the requirements for monitoring the effectiveness of maintenance at nuclear power plants provided in 10 CFR 50.65, there has been no history of corrosion-related degradation that has impaired cranes. Likewise, because cranes have not been operated beyond their design lifetime, there have been no significant fatigue-related structural failures.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

E-58

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.10 - Fire Protection Program

REVIEWER: K. Sullivan

GALL AMP: XI.M26 - Fire Protection

DATE: 01/10-01/14/2005

E-60 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A For operating plants, the fire protection aging management program (AMP) includes a fire barrier inspection program and a diesel-driven fire pump inspection program. The fire barrier inspection program requires periodic visual inspection of fire barrier penetration seals, fire barrier walls, ceilings, and floors, and periodic visual inspection and functional tests of fire rated doors to ensure that their operability is maintained. The diesel-driven fire pump inspection program requires that the pump be periodically tested to ensure that the fuel supply line can perform the intended function. The AMP also includes periodic inspection and test of halon/carbon dioxide fire suppression system.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Scope of Program:</p>	<p>A the AMP manages the aging effects on the intended function of the penetration seals, fire barrier walls, ceilings, and floors, and all fire rated doors (automatic or manual) that perform a fire barrier function. It also manages the aging effects on the intended function of the fuel supply line. The AMP also includes management of the aging effects on the intended function of the halon/carbon dioxide fire suppression system.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A the fire hazard analysis assesses the fire potential and fire hazard in all plant areas	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B It also specifies measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability for each fire area containing structures, systems, and components important to safety.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A Visual inspection of 10% of each type of penetration seal is performed during walkdowns carried out at least once every refueling outage.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B These inspections examine any sign of degradation such as cracking, seal separation from walls and components, separation of layers of material, rupture and puncture of seals which are directly caused by increased hardness and shrinkage of seal material due to weathering. B Visual inspection of the fire barrier walls, ceilings, and floors examines any sign of degradation such as cracking, spalling, and loss of material caused by freeze-thaw, chemical attack, and reaction with aggregates. C Hollow metal fire doors are visually inspected at least once bi-monthly for holes in the skin of the door. D Fire door clearances are also checked at least once bi-monthly as part of an inspection program. E Function tests of fire doors are performed daily, weekly, or monthly (which maybe plant specific) to verify the operability of automatic hold-open, release, closing mechanisms, and latches.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Hollow metal fire doors are visually inspected at least once bi-monthly for holes in the skin of the door.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D Fire door clearances are also checked at least once bi-monthly as part of an inspection program.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E Function tests of fire doors are performed daily, weekly, or monthly (which maybe plant specific) to verify the operability of automatic hold-open, release, closing mechanisms, and latches.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>F The diesel-driven fire pump is under observation during performance tests such as flow and discharge tests, sequential starting capability tests, and controller function tests for detecting any degradation of the fuel supply line.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>G Periodic visual inspection and function test at least once every six months examines the signs of degradation of the halon/carbon dioxide fire suppression system. The suppression agent charge pressure is monitored in the test. Material conditions that may affect the performance of the system, such as corrosion, mechanical damage, or damage to dampers, are observed during these tests. H Inspections performed at least once every month verify that the extinguishing agent supply valves are open and the system in automatic mode.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>H Inspections performed at least once every month verify that the extinguishing agent supply valves are open and the system in automatic mode.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A If any sign of degradation is detected within that 10%, the scope of the inspection and frequency is expanded to ensure timely detection of increased hardness and shrinkage of the penetration seal before the loss of the component intended function.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Inspection (VT-1 or equivalent) of the fire barrier walls, ceilings, and floors performed in walkdown at least once every refueling outage ensures timely detection for concrete cracking, spalling, and loss of material.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Visual inspection (VT-3 or equivalent) detects any sign of degradation of the fire door such as wear and missing parts.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>D Function tests promptly detect deficiencies in operational conditions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>E Periodic tests performed at least once every refueling outage, such as flow and discharge tests, sequential starting capability tests, and controller function tests performed on diesel-driven fire pump ensure fuel supply line performance.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>F The performance tests detect degradation of the fuel supply lines before the loss of the component intended function.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>G In the test of the halon/carbon dioxide fire suppression system, the suppression agent charge pressure is verified to be within in the normal band.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A The aging effects of weathering on fire barrier penetration seals are detectable by visual inspection and, based on operating experience, visual inspections performed at least once every refueling outage to detect any sign of degradation of fire barrier penetration seals prior to loss of the intended function.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B Concrete cracking, spalling, and loss of material are detectable by visual inspection and, based on operating experience, visual inspection performed at least once every refueling outage detects any sign of degradation of the fire barrier walls, ceilings, and floors before there is a loss of the intended function.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>C Wear, missing parts, or holes in the fire door are detectable by visual inspection and, based on operating experience, the visual inspection and function test performed bi-monthly which detects degradation of the fire doors prior to loss of the intended function.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D The performance of the fire pump is monitored during the periodic test to detect any degradation in the fuel supply lines. Periodic testing provides data (e.g., pressure) for trending necessary.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E The performance of the halon/carbon dioxide fire suppression system is monitored during the periodic test to detect any degradation in the system. These periodic tests provide data necessary for trending.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
6. Acceptance Criteria:	<p>A Inspection results are acceptable if there are no visual indications of cracking, separation of seals from walls and components, separation of layers of material, or ruptures or punctures of seals, no visual indications of concrete cracking, spalling and loss of material of fire barrier walls, ceilings, and floors, no visual indications of missing parts, holes, and wear and no deficiencies in the functional tests of fire doors.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B No corrosion is acceptable in the fuel supply line for diesel-driven fire pump.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C any signs of corrosion and mechanical damage of the halon/carbon dioxide fire suppression system are not acceptable.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	<p>A Silicone foam fire barrier penetration seals have experienced splits, shrinkage, voids, lack of fill, and other failure modes (IN 88-56, IN 94-28, and IN 97-70). Degradation of electrical racing way fire barrier such as small holes, cracking, and unfilled seals are found on routine walkdown (IN 91-47 and GL 92-08). Fire doors have experienced wear of the hinges and handles. Operating experience with the use of this AMP has shown that no corrosion-related problem has been reported for the fuel supply line, pump casing of the diesel-driven fire pump, and the halon/carbon dioxide suppression system.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.11 - Fire Water System Program

REVIEWER: K. Sullivan

GALL AMP: XI.M27 - Fire Water System

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The aging management program applies to water-based fire protection systems that consist of sprinklers, nozzles, fittings, valves, hydrants, hose stations, standpipes, water storage tanks, and aboveground and underground piping and components that are tested in accordance with the applicable National Fire Protection Association (NFPA) codes and standards. In addition to NFPA codes and standards, which do not currently contain programs to manage aging, portions of the fire protection sprinkler system, which are not routinely subjected to flow, are to be subjected to full flow tests at the maximum design flow and pressure before the period of extended operation (and at not more than 5-year intervals thereafter). In addition, a sample of sprinkler heads is to be inspected by using the guidance of NFPA 25, Section 2.3.3.1. This NFPA section states that "where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing." It also contains guidance to perform this sampling every 10 years after the initial field service testing. Finally, portions of fire protection suppression piping located aboveground and exposed to water are disassembled</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	and visually inspected internally once every refueling outage. The purpose of the full flow testing and internal visual inspections is to ensure that corrosion, microbiological influenced corrosion (MIC), or biofouling aging effects are managed such that the system function is maintained.	
1. Scope of Program:	A The aging management program focuses on managing loss of material due to corrosion, MIC, or biofouling of carbon steel and cast-iron components in fire protection systems exposed to water	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Hose station and standpipe are considered as piping in the AMP.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A To ensure no significant corrosion, MIC, or biofouling has occurred in water-based fire protection systems, periodic flushing, system performance testing, and inspections are conducted.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The parameters monitored are the system's ability to maintain pressure and internal system corrosion conditions.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A Fire protection system testing is performed to assure required pressures.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Internal inspections of aboveground fire protection piping and the smaller diameter fire suppression piping are performed on system components (when they are due to corrosion.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Repair and replacement actions are initiated as necessary.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D general requirements of existing fire protection programs include testing and maintenance of fire detection and suppression systems and surveillance procedures to ensure that fire detectors, as well as fire suppression systems and components, are operable	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>E Visual inspection of yard fire hydrants performed once every six months ensures timely detection of signs of degradation, such as corrosion.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>F Fire hydrant hose hydrostatic tests, gasket inspections, and fire hydrant flow tests, performed annually, ensure that fire hydrants can perform their intended function and provide of intended function can occur.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>G Sprinkler systems are inspected once every refueling outage to ensure that signs of degradation, such as corrosion, are detected in a timely manner.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A System discharge pressure is monitored continuously.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Results of system performance testing are monitored and trended as specified by the NFPA codes and standards.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Degradation identified by internal inspection is evaluated.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A The acceptance criteria are the ability of a fire protection system to maintain required pressure, no unacceptable signs of degradation observed during visual assessment of internal system conditions, and that no biofouling exists in the sprinkler systems that could cause corrosion in the sprinkler heads.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>10. Operating Experience:</p>	<p>A Water-based fire protection systems designed, inspected, tested and maintained in accordance with the NFPA minimum standards have demonstrated reliable performance.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-74 -

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.12 - Aboveground Carbon Steel Tanks Program

GALL AMP: XI.M29 - Aboveground Carbon Steel Tanks

REVIEWER: T. Terry

DATE: 01/10-01/14/2005

E-76 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The program includes preventive measures to mitigate corrosion by protecting the external surface of carbon steel tanks with paint or coatings in accordance with standard industry practice. The program also relies on periodic system walkdowns to monitor degradation of the protective paint or coating	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B for storage tanks supported on earthen or concrete foundations, corrosion may occur at inaccessible locations, such as the tank bottom. Accordingly, verification of the effectiveness of the program is to be performed to ensure that significant degradation in inaccessible locations is not occurring and the component intended function will be maintained during the extended period of operation. For reasons set forth below, an acceptable verification program consists of thickness measurement of the tank bottom surface.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
1. Scope of Program:	A The program consists of preventive measures to mitigate corrosion by protecting the external surfaces of carbon steel tanks protected with paint or coatings and periodic system walkdowns to manage the effects of corrosion on the intended function of these tanks. Plant walkdowns cover the entire outer surface of the tank up to its surface in contact with soil or concrete.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A In accordance with industry practice, tanks are coated with protective paint or coating to mitigate corrosion by protecting the external surface of the tank from environmental exposure.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Sealant or caulking at the interface edge between the tank and concrete or earthen foundation mitigates corrosion of the bottom surface of the tank by preventing water and moisture from penetrating the interface, which would lead to corrosion of the bottom surface.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The aging management program (AMP) utilizes periodic plant system walkdowns to monitor degradation because it is a condition directly related to the potential loss of materials.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A Periodic system walkdowns to confirm that the paint, coating, sealant, and caulking are intact is an effective method to manage the effects of corrosion on the external surface of the component.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B corrosion may occur at inaccessible locations, such as the tank bottom surface, and thickness measurement of the tank bottom is to be taken to ensure that significant degradation is not occurring and the component intended function will be maintained during the extended period of operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
5. Monitoring and Trending:	<p>A The effects of corrosion of the aboveground external surface are detectable by visual techniques. Based on operating experience, plant system walkdowns during each outage provide for timely detection of aging effects.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B The effects of corrosion of the underground external surface are detectable by thickness measurement of the tank bottom and are monitored and trended if significant material loss is detected.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
6. Acceptance Criteria:	<p>A Any degradation of paint, coating, sealant, and caulking is reported and will require further evaluation. Degradation consists of cracking, flaking, or peeling of paint or coatings, and drying, cracking or missing sealant and caulking.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Thickness measurements of the tank bottom are evaluated against the design thickness and corrosion allowance.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Coating degradation has occurred in safety-related systems and structures (Nuclear Regulatory Commission [NRC] Generic Letter [GL] 98-04). Corrosion damage near the concrete-metal interface and sand-metal interface has been reported in metal containments (NRC Information Notice [IN] 89-79, Supplement 1, and NRC IN 86-99, Supplement 1).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.13 - Fuel Oil Chemistry Program

REVIEWER: E. Grove

GALL AMP: XI.M30 - Fuel Oil Chemistry

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The program includes (a) surveillance and maintenance procedures to mitigate corrosion and (b) measures to verify the effectiveness of an aging management program (AMP) and confirm the absence of an aging affect.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Fuel oil quality is maintained by monitoring and controlling fuel oil contamination in accordance with the guidelines of the American Society for Testing Materials (ASTM) Standards D 1796, D2276, D2709, and D4057.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D The effectiveness of the program is verified to ensure that <u>significant degradation</u> is not occurring and the component intended function will be maintained during the extended period of operation. <u>Thickness measurement of tank bottom surfaces</u> is an acceptable verification program.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Scope of Program:</p>	<p>A The program is focused on managing the conditions that cause general, pitting, and microbiologically influence corrosion (MIC) of the diesel fuel tank <u>internal</u> surfaces. The program serves to reduce the potential of exposure of the <u>tank internal surface</u> to fuel oil contaminated with water and microbiological organisms.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A The quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. One-time inspection is an inspection activity independent of methods to mitigate or prevent degradation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Periodic cleaning of a tank allows removal of sediments</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A The AMP monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B The ASTM Standard D 4057 is used for guidance on oil sampling.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>C The ASTM Standards D 1796 and D 2709 are used for determination of water and sediment contamination in diesel fuel.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D For determination of particulates, modified ASTM D 2276, Method A, is used.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A Internal surfaces of tanks <u>that are drained for cleaning</u> are visually inspected to detect potential degradation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B However, corrosion may occur at locations in which contaminants may accumulate, such as a tank bottom, and an ultrasonic thickness measurement of the tank bottom surface ensures that significant degradation is not occurring.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Water and biological activity or particulate contamination concentrations are monitored and trended at least quarterly. Based on industry operating experience, quarterly sampling and analysis of fuel oil provide for timely detection of conditions conducive to corrosion of the internal surface of the diesel fuel oil tank before the potential loss of its intended function.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	A The ASTM Standard D 4057 is used for guidance on oil sampling.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The ASTM Standards D 1796 and D 2709 are used for guidance on the determination of water and sediment contamination in diesel fuel.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Modified ASTM D 2276, Method A is used for determination of particulates. The modification consists of using a filter with a pore size of 3.0 μm , instead of 0.8 μm .	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A The operating experience at some plants has included identification of water in the fuel, particulate contamination, and biological fouling. However, no instances of fuel oil system component failures attributed to contamination have been identified.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-86-

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.15 - One-Time Inspection Program

REVIEWER: E. Grove

GALL AMP: XI.M32 - One-Time Inspection

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The program includes measures to verify the effectiveness of an aging management program (AMP) and confirm the absence of an aging effect. There are cases where either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, or (b) an aging effect is expected to progress very slowly. The elements of the program include (a) determination of the sample size based on an assessment of materials of fabrication, environment, plausible aging effects, and operating experience; (b) identification of the inspection locations in the system or component based on the aging effect; (c) determination of the examination technique, including acceptance criteria that would be effective in managing the aging effect for which the component is examined; and (d) evaluation of the need for follow-up examinations to monitor the progression of any aging degradation. When evidence of an aging effect is revealed by a one-time inspection, the routine evaluation of the inspection results would identify appropriate corrective actions. As set forth below, an acceptable verification program may consist of a one-time inspection of selected components and susceptible locations in the system. An alternative acceptable program may include routine maintenance or a review of repair records to confirm that these components</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	have been inspected for aging degradation and significant aging degradation has not occurred and thereby verify the effectiveness of existing AMPs.	
1. Scope of Program:	A The program includes measures to verify that unacceptable degradation is not occurring, thereby validating the effectiveness of existing AMPs or confirming that there is no need to manage aging-related degradation for the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The structures and components for which one-time inspection is to verify the effectiveness of the AMPs (e.g., water chemistry control, etc.) have been identified in the Generic Aging Lessons Learned (GALL) report.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A One-time inspection is an inspection activity independent of methods to mitigate or prevent degradation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The program monitors parameters directly related to the degradation of a component.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Inspection is performed in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Code and 10 CFR 50, Appendix B, by using a variety of nondestructive examination (NDE) methods, including visual, volumetric, and surface techniques.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A The inspection includes a representative sample of the system population, and, where practical, focus on the bounding or lead components most susceptible to aging due to time in service, severity of operating conditions, and lowest design margin.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B For small-bore piping, actual inspection locations are based on physical accessibility, exposure levels, NDE techniques, and locations identified in Nuclear Regulatory Commission (NRC) Information Notice (IN) 97-46.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Combinations of NDE, including visual, ultrasonic, and surface techniques, are performed by qualified personnel following procedures consistent with the ASME Code and 10 CFR 50, Appendix B.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D For small-bore piping less than NPS 4 in., including pipe, fittings, and branch connections, a plant-specific destructive examination of replaced piping due to plant modifications or NDE that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>E Follow-up of unacceptable inspection findings includes expansion of the inspection sample size and locations.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>F With respect to inspection timing, the one-time inspection is to be completed before the end of the current operating license.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>G the inspection is not to be scheduled too early in the current operating term, which could raise questions regarding continued absence of aging effects prior to and near the extended period of operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A One-time inspection does not provide specific guidance on monitoring and trending.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B evaluation of the appropriateness of the techniques and timing of the one-time inspection improve with the accumulation of plant-specific and industry-wide experience.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	A Any indication or relevant conditions of degradation detected are evaluated..	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The ultrasonic thickness measurements are to be compared to predetermined limits, such as design minimum wall thickness	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A The elements that comprise these inspections (e.g., the scope of the inspections and inspection techniques) are consistent with years of industry practice and staff expectations.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

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E-92 -

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.16 - Selective Leaching of Materials Program

REVIEWER: T. Terry

GALL AMP: XI.M33 - Selective Leaching of Materials

DATE: 01/10-01/14/2005

E-03 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The program for selective leaching of materials ensures the integrity of the components made of cast iron, bronze, brass, and other alloys exposed to a raw water, brackish water, treated water, or groundwater environment that may lead to selective leaching of one of the metal components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The aging management program (AMP) a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of materials due to selective leaching is occurring, and whether the process will affect the ability of the components to perform their intended function for the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
1. Scope of Program:	A This AMP determines the acceptability of the components that may be susceptible to selective leaching and assess their ability to perform the intended function during the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B These components include piping, valve bodies, and bonnets, pump casing, and heat exchanger components.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C The materials of construction for these components may include cast iron, brass, bronze, or aluminum-bronze.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D These components may be exposed to a raw water, treated water, or groundwater environment.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E The AMP includes a one-time hardness measurement of a selected set of components to determine whether loss of material due to selective leaching is not occurring for the period of extended operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A The one-time visual inspection and hardness measurement is an inspection/verification program; thus, there is no preventive action.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
3. Parameters Monitored/Inspected:	A The visual inspection and hardness measurement is to be a one-time inspection.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Because selective leaching is a slow acting corrosion process, this measurement is performed just before the beginning of the license renewal period. Follow-up of unacceptable inspection findings includes expansion of the inspection sample size and location.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A The one-time visual inspection and hardness measurement includes close examination of a select set of components to determine whether selective leaching has occurred and whether the resulting loss of strength and/or material will affect the intended functions of these components during the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B One acceptable procedure is to visually inspect the susceptible components closely and conduct Brinell Hardness testing on the inside surfaces of the selected set of components to determine if selective leaching has occurred.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C If it is occurring, an engineering evaluation is initiated to determine acceptability of the affected components for further service.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
5. Monitoring and Trending:	A There is no monitoring and trending inspection and hardness measurement.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A Identification of selective leaching will define the need for further engineering evaluation before the affected components can be qualified for further service. If necessary, the evaluation will include a root cause analysis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A One-time inspection is a new program to be applied by the applicant. The elements that comprise these inspections (e.g., the scope of the inspections and inspection techniques) are consistent with years of industry practice and staff expectations.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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E-97 -

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.17 - Buried Piping And Tanks Inspection Program

REVIEWER: T. Terry

GALL AMP: XI.M34 - Buried Piping And Tanks Inspection

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The program includes preventive measures to mitigate corrosion.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B periodic inspection to manage the effects of corrosion on the pressure-retaining capacity of buried carbon steel piping and tanks	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Preventive measures are in accordance with standard industry practice for maintaining external coatings and wrappings	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D Buried piping and tanks are inspected when they are excavated during maintenance and when a pipe is dug up and inspected for any reason.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E this is an acceptable option to manage buried components, except for the program element/attributes of detection of aging effects (regarding inspection frequency) and operating experience. Thus, the staff further evaluates an applicant's inspection frequency and operating experience with buried components.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Scope of Program:</p>	<p>A The program relies on preventive measures such as coating and wrapping and periodic inspection for loss of material caused by corrosion of the external surface of buried carbon steel piping and tanks. Loss of material in these components, which may be exposed to aggressive soil environment, is caused by general, pitting, and crevice corrosion, and microbiologically influenced corrosion (MIC).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Periodic inspections are performed when the components are excavated for maintenance or for any other reason.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A In accordance with industry practice, underground piping and tanks are coated during installation with a protective coating system to protect the piping from contacting the aggressive soil environment.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The program monitors parameters such as coating and wrapping integrity that are directly related to corrosion damage of the external surface of buried carbon steel piping and tanks. Coatings and wrappings are inspected by visual techniques.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Any evidence of damaged wrapping or coating defects is an indicator of possible corrosion damage to the external surface of piping and tanks.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A Periodic inspection of susceptible locations to confirm that coating and wrapping are intact	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B The inspections are performed in areas with the highest likelihood of corrosion problems, and in areas with a history of corrosion problems.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Because the inspection frequency is plant specific and also depends on the plant operating experience, the applicant's proposed inspection frequency is to be further evaluated for the extended period of operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Results of previous inspections are used to identify susceptible locations.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A Any coating and wrapping degradations are reported and evaluated according to site corrective actions procedures.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Operating experience shows that the program described here is effective in managing corrosion of external surfaces of buried carbon steel components. However, because the inspection frequency is plant specific and also depends on the plant operating experience, the applicant's plant-specific operating experience is further evaluated for the extended period of operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-102 -

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.18 - ASME Section XI, Subsection IWE Program

REVIEWER: R. Morante

GALL AMP: XI.S1 - ASME Section XI, Subsection IWE

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The evaluation of 10 CFR 50.55a and Subsection IWE as an aging management program (AMP) for license renewal is provided below. 10 CFR 50.55a imposes the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Subsection IWE for steel containments (Class MC) and steel liners for concrete containments (Class CC). The full scope of IWE includes steel containment shells and their integral attachments; steel liners for concrete containments and their integral attachments; containment hatches and airlocks; seals, gaskets and moisture barriers; and pressure-retaining bolting. This evaluation covers both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda, as approved in 10 CFR 50.55a. ASME Code Section XI, Subsection IWE and the additional requirements specified in 10 CFR 50.55a(b)(2) constitute an existing mandated program applicable to managing aging of steel containments, steel liners of concrete containments, and other containment components for license renewal.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	A Subsection IWE-1000 specifies the components of steel containments and steel liners of concrete containments within its scope. The components within the scope of Subsection IWE are Class MC pressure-retaining components (steel containments) and their integral attachments; metallic shell and penetration liners of Class CC containments and their integral attachments; containment seals and gaskets; containment pressure-retaining bolting; and metal containment surface areas, including welds and base metal.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Subsection IWE exempts the following from examination: (1) Components that are outside the boundaries of the containment as defined in the plant-specific design specification; (2) Embedded or inaccessible portions of containment components that met the requirements of the original construction code of record; (3) Components that become embedded or inaccessible as a result of vessel repair or replacement, provided IWE-1232 and IWE-5220 are met; and (4) Piping, pumps, and valves that are part of the containment system or that penetrate or are attached to the containment vessel (governed by IWB or IWC).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C The 10 CFR 50.55a(b)(2)(ix) specifies additional requirements for inaccessible areas. It states that the licensee is to evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of or result in degradation to such inaccessible areas. Examination requirements for containment supports are not within the scope of Subsection IWE.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A No preventive actions are specified; Subsection IWE is a monitoring program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A Table IWE-2500-1 specifies seven categories for examination. Table IWE-2500-1 references the applicable section in IWE-3500 that identifies the aging effects that are evaluated. The parameters monitored or inspected depend on the particular examination category.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A The frequency and scope of examination specified in 10 CFR 50.55a and Subsection IWE ensure that aging effects would be detected before they would compromise the design-basis requirements.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A With the exception of inaccessible areas, all surfaces are monitored by virtue of the examination requirements on a scheduled basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B When component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs, and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period, in accordance with Examination Category E-C. When these reexaminations reveal that the flaws, areas of degradation, or repairs remain essentially unchanged for three consecutive inspection periods, these areas no longer require augmented examination in accordance with Examination Category E-C.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C IWE-2430 specifies that (a) examinations performed during any one inspection that reveal flaws or areas of degradation exceeding the acceptance standards are to be extended to include an additional number of examinations within the same category approximately equal to the initial number of examinations, and (b) when additional flaws or areas of degradation that exceed the acceptance standards are revealed, all of the remaining examinations within the same category are to be performed to the extent specified in Table IWE-2500-1 for the inspection interval.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D Alternatives to these examinations are provided in 10 CFR 50.55a(b)(2)(ix)(D).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	<p>A IWE-3000 provides acceptance standards for components of steel containments and liners of concrete containments</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B Table IWE-3410-1 presents criteria to evaluate the acceptability of the containment components for service following the preservice examination and each inservice examination. This table specifies the acceptance standard for each examination category.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	<p>A ASME Section XI, Subsection IWE was incorporated into 10 CFR 50.55a in 1996. Prior to this time, operating experience pertaining to degradation of steel components of containment was gained through the inspections required by 10 CFR Part 50, Appendix J and ad hoc inspections conducted by licensees and the Nuclear Regulatory Commission (NRC). NRC Information Notice (INs) 86-99, 88-82 and 89-79 described occurrences of corrosion in steel containment shells. NRC Generic Letter (GL) 87-05 addressed the potential for corrosion of boiling water reactor (BWR) Mark I steel drywells in the "sand pocket region." More recently, NRC IN 97-10 identified specific locations where concrete containments are susceptible to liner plate corrosion. The program is to consider the liner plate and containment shell corrosion concerns described in these generic communications.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	Implementation of the ISI requirements of Subsection IWE, in accordance with 10 CFR 50.55a, is a necessary element of aging management for steel components of steel and concrete containments through the period of extended operation.	

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-109 -

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.19 - ASME Section XI, Subsection IWL Program

REVIEWER: R. Morante

GALL AMP: XI.S2 - ASME Section XI, Subsection IWL

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The evaluation of 10 CFR 50.55a and Subsection IWL as an aging management program (AMP) for license renewal is provided below. 10 CFR 50.55a imposes the examination requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Subsection IWL for reinforced and prestressed concrete containments (Class CC). The scope of IWL includes reinforced concrete and unbonded post-tensioning systems. This evaluation covers both the 1992 Edition with the 1992 Addenda and the 1995 Edition with the 1996 Addenda, as approved in 10 CFR 50.55a. ASME Code Section XI, Subsection IWL and the additional requirements specified in 10 CFR 50.55a(b)(2) constitute an existing mandated program applicable to managing aging of containment reinforced concrete and unbonded post-tensioning systems for license renewal. IWL specifies acceptance criteria, corrective actions, and expansion of the inspection scope when degradation exceeding the acceptance criteria is found.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	<p>A Subsection IWL-1000 specifies the components of concrete containments within its scope. The components within the scope of Subsection IWL are reinforced concrete and containments, as defined by CC-1000. Subsection IWL exempts from examination portions of the concrete containment that are inaccessible (e.g., concrete covered by liner, foundation material, or backfill, or obstructed by adjacent structures or other components). 10 CFR 50.55a(b)(2)(viii) specifies additional requirements for inaccessible areas. It states that the licensee is to evaluate the acceptability of concrete in inaccessible areas when conditions exist in accessible areas that could indicate the presence of or result in degradation to such inaccessible areas. Steel liners for concrete containments and their integral attachments are not within the scope of Subsection IWL, but are included within the scope of Subsection IWE.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
2. Preventive Actions:	<p>A No preventive actions are specified; Subsection IWL is a monitoring program.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
3. Parameters Monitored/Inspected:	<p>A Table IWL-2500-1 specifies seven categories for Examination of concrete surfaces: Category L-A for all concrete surfaces and Category L-B for concrete surfaces surrounding tendon anchorages. Both of these categories rely on visual examination methods.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Concrete surfaces are examined for evidence of damage or degradation, such as concrete cracks. IWL-2510 specifies that concrete surfaces are examined for conditions indicative of degradation, such as those defined in ACI 201.1R-77.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Table IWL-2500-1 also specifies Category L-B for test and examination requirements for unbonded post tensioning systems. Tendon anchorage and wires or strands are visually examined for cracks, corrosion, and mechanical damage. Tendon wires or strands are also tested for yield strength, ultimate tensile strength, and elongation. Tendon corrosion protection medium is tested by analysis for alkalinity, water content, and soluble ion concentrations.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A The frequency and scope of examination specified in 10 CFR 50.55a and Subsection IWL ensure that aging effects would be detected before they would compromise the design-basis requirements.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Concrete inspections are performed in accordance with Examination Category L-A. Under Subsection IWL, inservice inspections for concrete and unbonded post-tensioning systems are required at one, three, and five years following the structural integrity test. Thereafter, inspections are performed at five-year intervals. For sites with two plants, the schedule for inservice inspection is provided in IWL-2421.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C In the case of tendons, only a sample of the tendons of each tendon type requires examination at each inspection. The tendons to be examined during an inspection are selected on a random basis. Table IWL-2521-1 specifies the number of tendons to be selected for each type (e.g., hoop, vertical, dome, helical, and inverted U) for each inspection period. The minimum number of each tendon type selected for inspection varies from 2 to 4%.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D Regarding detection methods for aging effects, all concrete surfaces receive a visual VT-3C examination. Selected areas, such as those that indicate suspect conditions and areas surrounding tendon anchorages, receive a more rigorous VT-1 or VT-1C examination.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E Prestressing forces in sample tendons are measured. In addition, one sample tendon of each type is detensioned. A single wire or strand is removed from each detensioned tendon for examination and testing. These visual examination methods and testing would identify the aging effects of accessible concrete components and prestressing systems in concrete containments.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Except in inaccessible areas, all concrete surfaces are monitored on a regular basis by virtue of the examination requirements. B For prestressed containments, trending of prestressing forces in tendons is required in accordance with paragraph (b)(2)(viii) of 10 CFR 50.55a.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B For prestressed containments, trending of prestressing forces in tendons is required in accordance with paragraph (b)(2)(viii) of 10 CFR 50.55a. In addition to the random sampling used for tendon examination, one tendon of each type is selected from the first-year inspection sample and designated as a common tendon. Each common tendon is then examined during each inspection.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C 10 CFR 50.55a and Subsection IWL also require that prestressing forces in all inspection sample tendons be measured by lift-off tests and compared with acceptance standards based on the predicted force for that type of tendon over its life.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A IWL-3000 provides acceptance criteria for concrete containments. For concrete surfaces, the acceptance criteria rely on the determination of the "Responsible Engineer" (as defined by the ASME Code) regarding whether there is any evidence of damage or degradation sufficient to warrant further evaluation or repair. The acceptance criteria are qualitative; guidance is provided in IWL-2510, which references ACI 201.1R-77 for identification of concrete degradation. Quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R may also be used to augment the qualitative assessment of the responsible engineer.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B The acceptance standards for the unbonded post-tensioning system are quantitative in nature. For the post tensioning system, quantitative acceptance criteria are given for tendon force and elongation, tendon wire or strand samples, and corrosion protection medium. 10 CFR 50.55a and Subsection IWL do not define the method for calculating predicted tendon prestressing forces for comparison to the measured tendon lift-off forces. The predicted tendon forces are to be calculated in accordance with Regulatory Guide 1.35.1, which provides an acceptable methodology for use through the period of extended operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>10. Operating Experience:</p>	<p>A ASME Section XI, Subsection IWL was incorporated into 10 CFR 50.55a in 1996. Prior to this time, operating experience pertaining to degradation of reinforced concrete and prestressing systems in concrete containments was gained through the inspections required by 10 CFR Part 50, Appendix J and ad hoc inspections conducted by licensees and the Nuclear Regulatory Commission (NRC). Recently, NRC Information Notice (IN) 99-10 described occurrences of degradation in prestressing systems. The program is to consider the degradation concerns described in this generic communication. Implementation of Subsection IWL, in accordance with 10 CFR 50.55a, is a necessary element of aging management for concrete containments through the period of extended operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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E-117 -

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.20 - ASME Section XI, Subsection IWF Program

REVIEWER: R. Morante

GALL AMP: XI.S3 - ASME Section XI, Subsection IWF

DATE: 01/10-01/14/2005

E-119 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The 10 CFR 50.55a imposes the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, for Class 1, 2, 3, and MC piping and components and their associated supports. Inservice inspection of supports for ASME piping and components is addressed in Section XI, Subsection IWF. This evaluation covers the 1989 Edition through the 1995 Edition and addenda through the 1996 Addenda, as approved in 10 CFR 50.55a. ASME Code Section XI, Subsection IWF constitutes an existing mandated program applicable to managing aging of ASME Class 1, 2, 3, and MC supports for license renewal.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B The IWF scope of inspection for supports is based on sampling of the total support population. The sample size varies depending on the ASME Class. The largest sample size is specified for the most critical supports (ASME Class 1). The sample size decreases for the less critical supports (ASME Class 2 and 3). Discovery of support deficiencies during regularly scheduled inspections triggers an increase of the inspection scope, in order to ensure that the full extent of deficiencies is identified. The primary inspection method employed is visual examination.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>Degradation that potentially compromises support function or load capacity is identified for evaluation. IWF specifies acceptance criteria and corrective actions. Supports requiring corrective actions are re-examined during the next inspection period.</p>	
<p>1. Scope of Program:</p>	<p>A For Class 1 piping and component supports, Subsection IWF (1989 edition) refers to Subsection IWB for the inspection scope and schedule. According to Table IWB-2500-1, only 25% of nonexempt supports are subject to examination. Supports exempt from examination are the supports for piping systems that are exempt from examination, according to pipe diameter or service. The same supports are inspected in each 10-year inspection interval.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B For Class 2, 3, and MC piping and component supports, Subsection IWF (1989 edition) refers to Subsections IWC, IWD, and IWE for the inspection scope and schedule. According to Table IWC-2500-1, 7.5% of nonexempt supports are subject to examination for Class 2 systems. The same supports are inspected in each 10-year inspection interval.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>C No specific numerical percentages are identified in Subsections IWD and IWE for Class 3 and Class MC, respectively.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A No preventive actions are specified; Subsection IWF is a inspection program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A IWF specifies visual examination (VT-3) of supports. The parameters monitored or inspected include corrosion; deformation; misalignment; improper clearances; improper spring settings; damage to close tolerance machined or sliding surfaces; and missing, detached, or loosened support items. The visual inspection would be expected to identify relatively large cracks.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A VT-3 visual examination is specified in Table IWF-2500-1. The complete inspection scope is repeated every 10-year inspection interval. The qualified VT-3 inspector uses judgment in assessing general corrosion; observed degradation is documented if loss of structural capacity is suspected.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A There is no requirement to monitor or report progressive, time-dependent degradation. Unacceptable conditions, according to IWF-3400, are noted for correction or further evaluation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	A The acceptance standards for visual examination are specified in IWF-3400.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A To date, IWF sampling inspections have been effective in managing aging effects for ASME Class 1, 2, 3, and MC supports. There is reasonable assurance that the Subsection IWF inspection program will be effective through the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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E-123 -

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.21 - 10 CFR Part 50, Appendix J Program

REVIEWER: E. Grove

GALL AMP: XI.S4 - 10 CFR Part 50, Appendix J

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A As described in 10 CFR Part 50, Appendix J, containment leak rate tests are required "to assure that (a) leakage through the primary reactor containment and systems and components penetrating primary containment shall not exceed allowable leakage rate values as specified in the technical specifications or associated bases and (b) periodic surveillance of reactor containment penetrations and isolation valves is performed so that proper maintenance and repairs are made during the service life of the containment, and systems and components penetrating primary containment. "Appendix J provides two options, A and B, either of which can be chosen to meet the requirements of a containment LRT program. Under Option A, all of the testing must be performed on a periodic interval. Option B is a performance-based approach. Some of the differences between these options are discussed below, and more detailed information for Option B is provided in the Nuclear Regulatory Commission (NRC) Regulatory Guide (RG) 1.163 and NEI 94-01, Rev. 0.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
1. Scope of Program:	A The scope of the containment LRT program includes all pressure-retaining components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Type A and B tests described in 10 CFR Part 50, Appendix J, are acceptable methods for performing these LRTs.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Leakage testing for containment isolation valves (normally performed under Type C tests), if not included under this program, is included under LRT programs for systems containing the isolation valves.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
2. Preventive Actions:	A No preventive actions are specified; the containment LRT program is a monitoring program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The parameters to be monitored are leakage rates through containment shells; containment liners; and associated welds, penetrations, fittings, and other access openings.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A A containment LRT program is effective in detecting degradation of containment shells, liners, and components that compromise the containment pressure boundary, including seals and gaskets. While the calculation of leakage rates demonstrates the leak-tightness and structural integrity of the containment, it does not by itself provide information that would indicate that aging degradation has initiated or that the capacity of the containment may have been reduced for other types of loads, such as seismic loading. This would be achieved with the additional implementation of an acceptable containment inservice inspection program as described in XI.S1 and XI.S2.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A With Option A, testing is performed on a regular fixed time interval as defined in 10 CFR Part 50, Appendix J.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B In the case of Option B, the interval for testing may be increased on the basis of acceptable performance in meeting leakage limits in prior tests. Additional details for implementing Option B are provided in NRC Regulatory Guide 1.163 and NEI 94-01, Rev.0.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A Acceptance criteria for leakage rates are defined in plant technical specifications.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	B These acceptance criteria meet the requirements in 10 CFR Part 50, Appendix J, and are part of each plant's current licensing basis.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A To date, the 10 CFR Part 50, Appendix J, LRT program has been effective in preventing unacceptable leakage through the containment pressure boundary. Implementation of Option B for testing frequency must be consistent with plant-specific operating experience.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
2.			
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E-128 -

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.22 - Masonry Wall Program

REVIEWER: T. Terry

GALL AMP: XI.S5 - Masonry Wall Program

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	<p>A Nuclear Regulatory Commission (NRC) IE Bulletin (IEB) 80-11, "Masonry Wall Design," and NRC Information Notice (IN) 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to IE Bulletin 80-11," constitute an acceptable basis for a masonry wall aging management program (AMP).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B The objective of the masonry wall program is to manage aging effects so that the evaluation basis established for each masonry wall within the scope of license renewal remains valid through the period of extended operation. Since the issuance of NRC IEB 80-11 and NRC IN 87-67, the NRC promulgated 10 CFR 50.65, the Maintenance Rule. Masonry walls may be inspected as part of the Structures Monitoring Program (XI.S6) conducted for the Maintenance Rule, provided the ten attributes described below are incorporated.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Important elements in the evaluation of many masonry walls during the NRC IEB 80-11 program included (1) installation of steel edge supports to provide a sound technical basis for boundary conditions used in seismic analysis and (2) installation of steel bracing to ensure containment of unreinforced masonry walls during a seismic event. Consequently, in addition to the development of cracks in the masonry walls, loss of function of the structural steel supports and bracing would also invalidate the evaluation basis. (NOTE TO REVIEWER: See GALL Vol. 2, III.B5. Steel supports for masonry walls are included in the category of miscellaneous structural steel supports. The Structures Monitoring Program is the identified AMP. Reviewer should confirm that the applicant has credited an appropriate AMP to manage aging of steel supports/bracing for masonry walls.)</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>1. Evaluation and Technical Basis</p>	<p>A The scope includes all masonry walls identified as performing intended functions in accordance with 10 CFR 54.4.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>2. Preventive Actions:</p>	<p>A No specific preventive actions are required.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
3. Parameters Monitored/Inspected:	A The primary parameter monitored is wall cracking that could potentially invalidate the evaluation basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A Visual examination of the masonry walls by qualified inspection personnel is sufficient. The frequency of inspection is selected to ensure there is no loss of intended function between inspections.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The inspection frequency may vary from wall to wall, depending on the significance of cracking in the evaluation basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C Unreinforced masonry walls that have not been contained by bracing warrant the most frequent inspection, because the development of cracks may invalidate the existing evaluation basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
5. Monitoring and Trending:	A Trending is not required. Monitoring is achieved by periodic examination for cracking.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A For each masonry wall, the extent of observed cracking of masonry and degradation of steel edge supports and bracing is not to invalidate the evaluation basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Corrective actions are taken if the extent of cracking and steel degradation is sufficient to invalidate the evaluation basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C An option is to develop a new evaluation basis that accounts for the degraded condition of the wall (i.e., acceptance by further evaluation).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A Since 1980, masonry walls that perform an intended function have been systematically identified through licensee programs in response to NRC IEB 80-11, USI A-46, and 10 CFR 50.48. NRC IN 87-67 documented lessons learned from the NRC IEB 80-11 program, and provided recommendations for administrative controls and periodic inspection to ensure that the evaluation basis for each safety-significant masonry wall is maintained. Whether conducted as a stand-alone program or as part of structures monitoring for MR, a masonry wall AMP that incorporates the recommendations delineated in NRC IN 87-67 should ensure that the intended functions of all masonry walls within the scope of license renewal are maintained for the period of extended operation.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

E-133 -

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.23 - Structures Monitoring Program

REVIEWER: R. Morante

GALL AMP: XI.S6 - Structures Monitoring Program

DATE: 01/10-01/14/2005

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A Implementation of structures monitoring under 10 CFR 50.65 (the Maintenance Rule) is addressed in Nuclear Regulatory Commission (NRC) Regulatory Guide (RG) 1.160, Rev. 2, and NUMARC 93-01, Rev. 2. These two documents provide guidance for development of licensee-specific programs to monitor the condition of structures and structural components within the scope of the Maintenance Rule, such that there is no loss of structure or structural component intended function. Because structures monitoring programs are licensee-specific, the Evaluation and Technical Basis for this aging management program (AMP) is based on the implementation guidance provided in Regulatory Guide 1.160, Rev. 2, and NUMARC 93-01, Rev. 2. Existing licensee-specific programs developed for the implementation of structures monitoring under 10 CFR 50.65 are acceptable for license renewal provided these programs satisfy the 10 attributes described below.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B If protective coatings are relied upon to manage the effects of aging for any structures included in the scope of this AMP, the structures monitoring program is to address protective coating monitoring and maintenance.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Evaluation and Technical Basis</p>	<p>A The applicant specifies the structure/aging effect combinations that are managed by its structures monitoring program.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A No preventive actions are specified.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A For each structure/aging effect combination, the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected and the extent of degradation can be determined.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Parameters monitored or inspected are to be commensurate with industry codes, standards and guidelines, and are to also consider industry and plant-specific operating experience.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Although not required, ACI 349.3R-96 and ANSI/ASCE 11-90 provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements and for steel liners, joints, coatings, and waterproofing membranes (if applicable).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D If necessary for managing settlement and erosion of porous concrete subfoundations, the continued functionality of a site de-watering system is to be monitored.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E The plant-specific structures monitoring program is to contain sufficient detail on parameters monitored or inspected to conclude that this program attribute is satisfied.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A For each structure/aging effect combination, the inspection methods, inspection schedule, and inspector qualifications are selected to ensure that aging degradation will be detected and quantified before there is loss of intended functions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Inspection methods, inspection schedule, and inspector qualifications are to be commensurate with industry codes, standards and guidelines, and are to also consider industry and plant-specific operating experience.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Although not required, ACI 349.3R-96 and ANSI/ASCE 11-90 provide an acceptable basis for addressing detection of aging effects.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D The plant-specific structures monitoring program is to contain sufficient detail on detection to conclude that this program attribute is satisfied.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Regulatory Position 1.5, "Monitoring of Structures," in RG 1.160, Rev. 2, provides an acceptable basis for meeting the attribute.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B A structure is monitored in accordance with 10 CFR 50.65 (a)(2) provided there is no significant degradation of the structure.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C A structure is monitored in accordance with 10 CFR 50.65 (a)(1) if the extent of degradation is such that the structure may not meet its design basis or, if allowed to continue uncorrected until the next normally scheduled assessment, may not meet its design basis.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
6. Acceptance Criteria:	<p>A For each structure/aging effect combination, the acceptance criteria are selected to ensure that the need for corrective actions will be identified before loss of intended functions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B Acceptance criteria are to be commensurate with industry codes, standards and guidelines, and are to also consider industry and plant-specific operating experience.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>C Although not required, ACI 349.3R-96 provides an acceptable basis for developing acceptance criteria for concrete structural elements, steel liners, joints, coatings, and waterproofing membranes.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	D The plant-specific structures monitoring program is to contain sufficient detail on acceptance criteria to conclude that this program attribute is satisfied.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A Although in many plants structures monitoring programs have only recently been implemented, plant maintenance has been ongoing since initial plant operation. A plant-specific program that includes the attributes described above will be an effective AMP for license renewal.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effectuated Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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E-141 -

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.24 - Protective Coating Monitoring And Maintenance Program **REVIEWER: N. Dudley**

GALL AMP: XI.S8 - Protective Coating Monitoring And Maintenance Program **DATE: 01/10-01/14/2005**

E-142 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A Regulatory Position C4 in RG 1.54, Rev. 1, describes an acceptable technical basis for a Service Level I coatings monitoring and maintenance program that can be credited for managing the effects of corrosion for carbon steel elements inside containment.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B A comparable program for monitoring and maintaining protective coatings inside containment, developed in accordance with RG 1.54, Rev. 0 or the American National Standards Institute (ANSI) standards (since withdrawn) referenced in RG 1.54, Rev. 0, and coatings maintenance programs described in licensee responses to GL 98-04, is also acceptable as an aging management program (AMP) for license renewal	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
1. Scope of Program	A The minimum scope of the program is Service Level I coatings, defined in RG 1.54, Rev 1, as follows: "Service Level I coatings are used in areas inside the reactor containment where the coating failure could adversely affect the operation of post-accident fluid systems and thereby impair safe shutdown."	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A With respect to loss of material due to corrosion of carbon steel elements, this program is a preventive action.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A Regulatory Position C4 in RG 1.54, Rev 1, states that "ASTM D 5163-96 provides guidelines that are acceptable to the NRC staff for establishing an in-service coatings monitoring program for Service Level I coating systems in operating nuclear power plants..." ASTM D 5163-96, subparagraph 9.2, identifies the parameters monitored or inspected to be "any visible defects, such as blistering, cracking, flaking, peeling, rusting, and physical damage."	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A ASTM D 5163-96, paragraph 5, defines the inspection frequency to be each refueling outage or during other major maintenance outages as needed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B ASTM D 5163-96, paragraph 8, discusses the qualifications for inspection personnel, the inspection coordinator and the inspection results evaluator.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C ASTM D 5163-96, subparagraph 9.1, discusses development of the inspection plan and the inspection methods to be used.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D After a walk-through, thorough visual inspections shall be carried out on previously designated areas and on areas noted as deficient during the walk-through.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E A thorough visual inspection shall also be carried out on all coatings near sumps or screens associated with the Emergency Core Cooling System (ECCS)." This subparagraph also addresses field documentation of inspection results. ASTM D 5163-96, subparagraph 9.5, identifies instruments and equipment needed for inspection.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A ASTM D 5163-96 identifies monitoring and trending activities in subparagraph 6.2, which specifies a pre-inspection review of the previous two monitoring reports, and in subparagraph 10.1.2, which specifies that the inspection report should prioritize repair areas as either needing repair during the same outage or postponed to future outages, but under surveillance the interim period.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	A ASTM D 5163-96, subparagraphs 9.2.1 through 9.2.6, 9.3 and 9.4, contain guidance for characterization, documentation, and testing of defective or deficient coating surfaces.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B ASTM D 5163-96, paragraph 11, addresses evaluation. It specifies that the inspection report is to be evaluated by the responsible evaluation personnel, who prepare a summary of findings and recommendations for future surveillance or repair, including an analysis of reasons or suspected reasons for failure.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A NRC Generic Letter 98-04 describes industry experience pertaining to coatings degradation inside containment and the consequential clogging of sump strainers. RG 1.54, Rev. 1, was issued in July 2000. Monitoring and maintenance of Service Level I coatings conducted in accordance with Regulatory Position C4 is expected to be an effective program for managing degradation of Service Level I coatings, and consequently an effective means to manage loss of material due to corrosion of carbon steel structural elements inside containment.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-146 -

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.25 - Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program

REVIEWER: D. Nguyen / L. Tran

GALL AMP: XI.E1 - Electrical Cables and Connections not Subject to 10 CFR 50.49 Environmental Qualification Requirements

DATE: 01/10-01/14/2005

E-148 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The purpose of the aging management program described herein is to provide reasonable assurance that the intended functions of electrical cables and connections that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are exposed to adverse localized environments caused by heat, radiation, or moisture will be maintained consistent with the current licensing basis through the period of extended operation. This program considers the technical information and guidance provided in NUREG/CR-5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>B The program described herein is written specifically to address cables and connections at plants whose configuration is such that most (if not all) cables and connections installed in adverse localized environments are accessible.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C Since they are not subject to the environmental qualification requirements of 10 CFR 50.49, the electrical cables and connections covered by this aging management program are either not exposed to harsh accident conditions or are not required to remain functional during or following an accident to which they are exposed.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>1. Evaluation and Technical Basis</p>	<p>A This inspection program applies to accessible electrical cables and connections within the scope of license renewal that are installed in adverse localized environments caused by heat or radiation in the presence of oxygen</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>2. Preventive Actions:</p>	<p>A This is an inspection program and no actions are taken as part of this program to prevent or mitigate aging degradation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A A representative sample of accessible electrical cables and connections installed in adverse localized environments are visually inspected for cable and connection jacket surface anomalies, such as embrittlement, discoloration, cracking, or surface contamination. The technical basis for the sample selected is to be provided.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A Accessible electrical cables and connections installed in adverse localized environments are visually inspected at least once every 10 years.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The first inspection for license renewal is to be completed before the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A Trending actions are not included as part of this program because the ability to trend inspection results is limited.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A the accessible cables and connections are to be free from unacceptable, visual indications of surface anomalies, which suggest that conductor insulation or connection degradation exists. An unacceptable indication is defined as a noted condition or situation that, if left unmanaged, could lead to a loss of the intended function.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	<p>A Operating experience has shown that adverse localized environments caused by heat or radiation for electrical cables and connections may exist next to or above (within three feet of) steam generators, pressurizers or hot process pipes, such as feedwater lines. These adverse localized environments have been found to cause degradation of the insulating materials on electrical cables and connections that is visually observable, such as color changes or surface cracking. These visual indications can be used as indicators of degradation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

E-151 -

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.26 - Electrical Cables and Connectors Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in I&C Circuits Program

REVIEWER: D. Nguyen / L.Tran

GALL AMP: XI.E2 - Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits

DATE: 01/10-01/14/2005

E-153 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
<p>Program Description</p>	<p>A The purpose the aging management program described herein is to provide reasonable assurance that the intended functions of electrical cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are used in circuits with sensitive, low-level signals exposed to adverse localized environments caused by heat, radiation or moisture will be maintained consistent with the current licensing basis through the period of extended operation. This program considers the technical information and guidance provided in NUREG/CR-5643, IEEE Std. P1205, SAND96-0344, and EPRI TR-109619. In this aging management program, routine calibration tests performed as part of the plant surveillance test program are used to identify the potential existence of aging degradation. When an instrumentation loop is found to be out of calibration during routine surveillance testing, trouble shooting is performed on the loop, including the instrumentation cable.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B Since they are not subject to the environmental qualification requirements of 10 CFR 50.49, the electrical cables covered by this aging management program are either not exposed to harsh accident conditions or are not required to remain functional during or following an accident to which they are exposed.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>1. Evaluation and Technical Basis</p>	<p>A This program applies to electrical cables used in circuits with sensitive, low-level signals such as radiation monitoring and nuclear instrumentation that are within the scope of license renewal.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>2. Preventive Actions:</p>	<p>A This is a surveillance testing program and no actions are taken as part of this program to prevent or mitigate aging degradation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A The parameters monitored are determined from the plant technical specifications and are specific to the instrumentation loop being calibrated, as documented in the surveillance test procedure.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A Calibration provides sufficient indication of the need for corrective actions by monitoring key parameters and providing trending data based on acceptance criteria related to instrumentation loop performance.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>B The normal calibration frequency specified in the plant technical specifications provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. The first tests for license renewal are to be completed before the period of extended operation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>5. Monitoring and Trending:</p>	<p>A Trending actions are not included as part of this program because the ability to trend test results is dependent on the specific type of test chosen.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>6. Acceptance Criteria:</p>	<p>A Calibration readings are to be within the loop-specific acceptance criteria, as set out in the plant technical specifications surveillance test procedures.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>10. Operating Experience:</p>	<p>A Operating experience has shown that a significant number of cable failures are identified through routine calibration testing. Changes in instrument calibration can be caused by degradation of the circuit cable and are one indication of potential electrical cable degradation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-156 -

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.2.27 - Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements Program

REVIEWER: D. Nguyen / L. Tran

GALL AMP: XI.E3 Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

DATE: 01/10-01/14/2005

E-158 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A The purpose of the aging management program described herein is to provide reasonable assurance that the intended functions of inaccessible medium-voltage cables that are not subject to the environmental qualification requirements of 10 CFR 50.49 and are exposed to adverse localized environments caused by moisture while energized will be maintained consistent with the current licensing basis through the period of extended operation	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B In this aging management program periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and conduit, and draining water, as needed	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>C The electrical cables covered by this aging management program are either not exposed to harsh accident conditions or are not required to remain functional during or following an accident to which they are exposed</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>D The electrical cables covered by this aging management program are either not exposed to harsh accident conditions or are not required to remain functional during or following an accident to which they are exposed</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Evaluation and Technical Basis</p>	<p>A This program applies to inaccessible (e.g., in conduit or direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures to moisture that last more than a few days (e.g., cable in standing water). Periodic exposures to moisture that last less than a few days (i.e., normal rain and drain) are not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time. The moisture and voltage exposures described as significant in these definitions, which are based on operating experience and engineering judgment, are not significant for medium-voltage cables that are designed for these conditions (e.g., continuous wetting and continuous energization is not significant for submarine cables).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
2. Preventive Actions:	A Periodic actions are taken to prevent cables from being exposed to significant moisture, such as inspecting for water collection in cable manholes and conduit, and draining water, as needed. Medium-voltage cables for which such actions are taken are not required to be tested since operating experience indicates that prolonged exposure to moisture and voltage are required to induce this aging mechanism.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A medium-voltage cables exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
4. Detection of Aging Effects:	A In-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested at least once every 10 years. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other testing that is state-of-the-art at the time the test is performed	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A Trending actions are not included as part of this program because the ability to trend test results is dependent on the specific type of test chosen.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
6. Acceptance Criteria:	A The acceptance criteria for each test is defined by the specific type of test performed and the specific cable tested.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A Operating experience has shown that XLPE or high molecular weight polyethylene (HMWPE) insulation materials are most susceptible to water tree formation. The formation and growth of water trees varies directly with operating voltage. Treeing is much less prevalent in 4kV cables than those operated at 13 or 33kV. Also, minimizing exposure to moisture minimizes the potential for the development of water treeing. As additional operating experience is obtained, lessons learned can be used to adjust the program, as needed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
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Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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E-162 -

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.3.1 - Reactor Coolant Pressure Boundary Fatigue Monitoring Program

REVIEWER: R. Morante

GALL AMP: X.M1 - Metal Fatigue Of Reactor Coolant Pressure Boundary

DATE: 01/10-01/14/2005

E-163 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A In order not to exceed the design limit on fatigue usage, the aging management program (AMP) monitors and tracks the number of critical thermal and pressure transients for the selected reactor coolant system components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B AMP addresses the effects of the coolant environment on component fatigue life by assessing the impact of the reactor coolant environment on a sample of critical components that includes, as a minimum, those components selected in NUREG/CR-6260.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C The sample of critical components can be evaluated by applying environmental correction factors to the existing ASME Code fatigue analyses. Formulas for calculating the environmental life correction factors are contained in NUREG/CR-6583 for carbon and low-alloy steels and in NUREG/CR-5704 for austenitic stainless steels.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D As evaluated below, this is an acceptable option for managing metal fatigue for the reactor coolant pressure boundary, considering environmental effects. Thus, no further evaluation is recommended for license renewal if the applicant selects this option under 10 CFR 54.21(c)(1)(iii) to evaluate metal fatigue for the reactor coolant pressure boundary.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>1. Scope of Program:</p>	<p>A The program includes preventive measures to mitigate fatigue cracking of metal components of the reactor coolant pressure boundary caused by anticipated cyclic strains in the material.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>2. Preventive Actions:</p>	<p>A Maintaining the fatigue usage factor below the design code limit and considering the effect of the reactor water environment, as described under the program description, will provide adequate margin against fatigue cracking of reactor coolant system components due to anticipated cyclic strains.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A The program monitors all plant transients that cause cyclic strains, which are significant contributions to the fatigue usage factor. The number of plant transients that cause significant fatigue usage for each reactor coolant pressure boundary component is to be monitored.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>B Alternatively, more detailed local monitoring of the plant transient may be used to compute the actual fatigue usage for each transient.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects:	A The program provides for periodic update of the fatigue usage calculations.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
5. Monitoring and Trending:	A The program monitors a sample of high fatigue usage locations. As a minimum, this sample is to include the locations identified in NUREG/CR-6260.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A Maintain the fatigue usage below the design code limit considering environmental fatigue effects.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	A Acceptable corrective actions include a more rigorous analysis of the component to demonstrate that the design code limit will not be exceeded, repair, or replacement of the component. For programs that monitor a sample of high fatigue usage locations, corrective actions include a review of additional affected reactor coolant pressure boundary locations.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
10. Operating Experience:	A The program reviews industry experience regarding fatigue cracking. Applicable experience with fatigue cracking is to be considered in selecting the monitored locations.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
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E-166 -

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
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Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
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FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: Brunswick Steam Electric Plant, Units 1 and 2 (BSEP)

LRA AMP: B.3.2 - Environmental Qualification (EQ) Program
GALL AMP: X.E1 - Environmental Qualification (EQ) of Electric Components

REVIEWER: D. Nguyen / L. Tran

DATE: 01/10-01/14/2005

E-168 -

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A 10 CFR 50.49 defines the scope of components to be included, requires the preparation and maintenance of a list of in-scope components.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B Requires the preparation and maintenance of a qualification file that includes component performance specifications, electrical characteristics, and the environmental conditions to which the components could be subjected.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C 10 CFR 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>D 10 CFR 50.49(e) also requires replacement or refurbishment of components not qualified for the current license term prior to the end of designated life, unless additional life is established through ongoing qualification.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>E 10 CFR 50.49(k) and (l) permit different qualification criteria to apply based on plant and component vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in the DOR Guidelines, Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors; NUREG-0588, Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment; and Regulatory Guide 1.89, Rev. 1, Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>F Important attributes for the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>G Generic Safety Issue (GSI) 168, which is related to low-voltage EQ instrumentation and control cables, is currently an open generic issue. NRC research is ongoing to provide information to resolve it. An applicant is to address GSI-168 in its application for staff review.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
EQ Component Reanalysis Attributes	A Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of an EQ program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The analytical models used in the reanalysis of an aging evaluation are the same as those previously applied during the prior evaluation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D Temperature data used in an aging evaluation is to be conservative and based on plant design temperatures or on actual plant temperature data.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	E Plant temperature data can be obtained in several ways, including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors (while the motor is not running).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>F A representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>G Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation, or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>H Any changes to material activation energy values as part of a reanalysis are to be justified on a plant-specific basis.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>I Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
	<p>J When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
	<p>K If the qualification cannot be extended by reanalysis, the component is to be refurbished, replaced, or requalified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful).</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>1. Scope of Program:</p>	<p>A EQ programs apply to certain electrical components that are important to safety and could be exposed to harsh environment accident conditions, as defined in 10 CFR 50.49.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>2. Preventive Actions:</p>	<p>A 10 CFR 50.49 does not require actions that prevent aging effects.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>3. Parameters Monitored/Inspected:</p>	<p>A EQ component qualified life is not based on condition or performance monitoring.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A 10 CFR 50.49 does not require the detection of aging effects for in-service components.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
5. Monitoring and Trending:	A 10 CFR 50.49 does not require monitoring and trending of component condition or performance parameters of in-service components to manage the effects of aging.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
6. Acceptance Criteria:	A 10 CFR 50.49 acceptance criteria are that an inservice EQ component is maintained within the bounds of its qualification basis, including (a) its established qualified life and (b) continued qualification for the projected accident conditions.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B When monitoring is used to modify a component qualified life, plant-specific acceptance criteria are established based on applicable 10 CFR 50.49(f) qualification methods.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
7. Corrective Actions:	Not reviewed by RLEP-B project team	N/A
8. Confirmation Process:	Not reviewed by RLEP-B project team	N/A
9. Administrative Controls:	Not reviewed by RLEP-B project team	N/A
10. Operating Experience:	A EQ programs include consideration of operating experience to modify qualification bases and conclusions, including qualified life. Compliance with 10 CFR 50.49 provides reasonable assurance that components can perform their intended functions during accident conditions after experiencing the effects of inservice aging.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Exceptions

Item Number	Effected Program Element	LRA Exception Description	Basis for Accepting Exception	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
2.				
...				

Enhancements

Item Number	Effected Program Element	LRA Enhancement Description	Basis for Accepting Enhancement	Documents Reviewed (Identifier, Para.# and/or Page #)
1.				
2.				
...				

E-174 -

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
2.			
3.			
4.			
....			

FSAR supplement review: *(Evaluate App. A program description, scope, and commitments for enhancements vs. App. B)*

Applicant contact: *(Name, Organization, Telephone Number, E-mail Address)*

APPENDIX F

PLANT-SPECIFIC AMP AUDIT/REVIEW WORKSHEET

The worksheet provided in this appendix is designed to assist the reviewer in documenting the basis for the assessment of the applicant's plant-specific AMP elements and sub-elements against the program elements and sub-elements contained in Branch Technical Position RLSB-1 "Aging Management Review - Generic," in Appendix A to the SRP-LR. The worksheet provides a systematic method to record the basis for assessments and to identify where the applicant needs to provide clarification or additional information. Information recorded in the worksheets will be used to prepare the audit report and the safety evaluation report input.

AUDIT WORKSHEET
GALL REPORT AMP

PLANT: _____

LRA AMP: _____

REVIEWER: _____

GALL AMP: Plant-Specific Program from Appendix A of SRP-LR
 (Branch Technical Positions RLSB-1)

DATE: _____

F-2 -

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
Program Description	Appendix A of the SRP-LR does not define acceptance criteria for the program description. However, the reviewer should evaluate the plant specific AMP program description to confirm that it is consistent with the scope and function of the AMP.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
1. Scope of Program:	A The specific program necessary for license renewal should be identified. The scope of the program should include the specific structures and components being managed by the AMP.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

² The program elements for a plant specific AMP are defined in Appendix A of the SRP-LR (NUREG-1800).

³ The generic program elements defined in Appendix A to the SRP-LR may not be applicable to all plant specific AMPs. When this is the case, Appendix A typically provides a basis why an AMP does not need to implement particular auditable criteria of the program element. Document the basis why a criterion of a particular program element does not apply.

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
2. Preventive Actions:	A The activities for prevention and mitigation programs should be described. These actions should mitigate or prevent aging degradation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B For condition or performance monitoring programs, they do not rely on preventive actions and thus, this information need not be provided. More than one type of aging management program may be implemented to ensure that aging effects are managed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
3. Parameters Monitored/Inspected:	A The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B For a condition monitoring program, the parameter monitored or inspected should detect the presence and extent of aging effects. Some examples are measurements of wall thickness and detection and sizing of cracks.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>C For a performance monitoring program, a link should be established between the degradation of the particular structure or component intended function(s) and the parameter(s) being monitored. A performance monitoring program may not ensure the structure and component intended function(s) without linking the degradation of passive intended functions with the performance being monitored.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>D For prevention and mitigation programs, the parameters monitored should be the specific parameters being controlled to achieve prevention or mitigation of aging effects.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
<p>4. Detection of Aging Effects:</p>	<p>A The parameters to be monitored or inspected should be appropriate to ensure that the structure and component intended function(s) will be adequately maintained for license renewal under all CLB design conditions.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>B Provide information that links the parameters to be monitored or inspected to the aging effects being managed.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>C Thus, the effects of aging on a structure or component should be managed to ensure its availability to perform its intended function(s) as designed when called upon.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>
	<p>D A program based solely on detecting structure and component failure should not be considered as an effective aging management program for license renewal.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment:</p>

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>E This program element describes “when,” “where,” and “how” program data are collected (i.e., all aspects of activities to collect data as part of the program).</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>F Provide justification, including codes and standards referenced, that the technique and frequency are adequate to detect the aging effects before a loss of SC intended function. A program based solely on detecting SC failures is not considered an effective aging management program.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>G When sampling is used to inspect a group of SCs, provide the basis for the inspection population and sample size. The inspection population should be based on such aspects of the SCs as a similarity of materials of construction, fabrication, procurement, design, installation, operating environment, or aging effects. The sample size should be based on such aspects of the SCs as the specific aging effect, location, existing technical information, system and structure design, materials of construction, service environment, or previous failure history.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>H The samples should be biased toward concern in the period of extended operation. Provisions should also be included on expanding the sample size when degradation is detected in the initial sample.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
<p>5. Monitoring and Trending:</p>	<p>A Monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effect timely corrective or mitigative actions. Plant-specific and/or industry-wide operating experience may be considered in evaluating the appropriateness of the technique and frequency.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>B This program element describes “how” the data collected are evaluated and may also include trending for a forward look. This includes an evaluation of the results against the acceptance criteria and a prediction regarding the rate of degradation in order to confirm that timing of the next scheduled inspection will occur before a loss of SC intended function.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>C The parameter or indicator trended should be described.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>D The methodology for analyzing the inspection or test results against the acceptance criteria should be described.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>E Trending is a comparison of the current monitoring results with previous monitoring results in order to make predictions for the future.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
6. Acceptance Criteria:	A The acceptance criteria of the program and its basis should be described.	Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	B The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the structure and component intended function(s) are maintained under all CLB design conditions during the period of extended operation.	Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	C The program should include a methodology for analyzing the results against applicable acceptance criteria.	Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:
	D Corrective action is taken, such as piping replacement, before reaching this acceptance criterion.	Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria: Comment:

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>E Acceptance criteria could be specific numerical values, or could consist of a discussion of the process for calculating specific numerical values of conditional acceptance criteria to ensure that the structure and component intended function(s) will be maintained under all CLB design conditions. Information from available references may be cited.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>F It is not necessary to justify any acceptance criteria taken directly from the design basis information that is included in the FSAR because that is a part of the CLB. Also, it is not necessary to discuss CLB design loads if the acceptance criteria do not permit degradation because a structure and component without degradation should continue to function as originally designed.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
	<p>G Acceptance criteria, which do permit degradation, are based on maintaining the intended function under all CLB design loads.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>

Program Element	Auditable GALL Criteria ²	Documentation of Audit Finding ³
	<p>H Qualitative inspections should be performed to same predetermined criteria as quantitative inspections by personnel in accordance with ASME Code and through approved site specific programs.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>
<p>7. Corrective Actions:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>8. Confirmation Process:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>9. Administrative Controls:</p>	<p>Not reviewed by RLEP-B project team</p>	<p>N/A</p>
<p>10. Operating Experience:</p>	<p>A Operating experience with existing programs should be discussed. The operating experience of aging management programs, including past corrective actions resulting in program enhancements or additional programs, should be considered. A past failure would not necessarily invalidate an aging management program because the feedback from operating experience should have resulted in appropriate program enhancements or new programs. This information can show where an existing program has succeeded and where it has failed (if at all) in intercepting aging degradation in a timely manner. This information should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.</p>	<p>Consistent with Appendix A of the SRP-LR: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:</p> <p>Comment</p>

Document Reviewed During Audit:

Document Number	Identifier (number)	Title	Revision and/or Date
1.			
2.			
3.			
4.			
....			

APPENDIX G

AGING MANAGEMENT REVIEW WORKSHEETS

The worksheets provided in this appendix are designed to assist the reviewer in documenting the basis for the project team's assessments of the AMR results presented in LRA Tables 3.X.1 and in the "consistent with GALL" line entries (Notes A through E) in LRA Tables 3.X.Y.2. The worksheets provide a systematic method to record the basis for assessments and to identify where the applicant needs to provide clarification or additional information. Information recorded in the worksheets will be used to prepare the audit report and the safety evaluation report input.

BSEP AMR Component (Table 1) Worksheet		Audit Date:
Unit:	Table No.:	Chapter:
Auditor Name(s) :		

The project team evaluated whether items in Table 3.x.1 (Table 1) correspond to items in the GALL Volume 1, Table X. All items applicable to PWRs in Table 1 were reviewed and are addressed in the following table.

Item No.	Further Evaluation Recommended	Discussion

Audit Remarks (Document all questions for the applicant here):

No.	Question for applicant (draft per RAI guidance)	Response (with date)

References/Documents Used:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

BSEP AMR MEAP Comparison (Table 2) Worksheet		Audit Date:
Unit:	Table No.:	Chapter:
Auditor Name(s) :		

Line items to which Notes A, B, C, D, and E are applied or for which a precedent was cited (except for those assigned to DE) were reviewed for: 1) consistency with NUREG-1801, Volume 2 tables, and 2) adequacy of the aging managing programs. All items in the Table 2 of the system named above are acceptable with the exception of items in **boldface** type. (Reviewers need not duplicate information in the 2nd-5th columns that are reflected in the discussion/draft audit report.)

LRA Page No.	Component Type	Material	Environment	Aging Effect	Note	Discussion (draft as Audit Report input)

Audit Remarks (Document all questions for the applicant here):

No.	Question for applicant (draft per RAI guidance)	Response (with date)

References/Documents Used:

- 1.
- 2.
- 3.
- 4.
- 5.

APPENDIX H

ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
ACI	American Concrete Institute
ADAMS	Agency wide documents access and management system
ADS	Automatic Depressurization System
AERM	Aging Effects Requiring Management
AISC	American Institute of Steel Construction
AMP	Aging Management Program
AMR	Aging Management Review
ANSI	American National Standards Institute
API	American Petroleum Institute
APRM	Average Power Range Monitor
ARM	Area Radiation Monitor
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATWS	Anticipated Transient Without Scram
ATWS-RPT	Anticipated Transient Without Scram-Recirculation Pump Trip
BNL	Brookhaven National Laboratory
BNP	Brunswick Nuclear Plant
BSEP	Brunswick Steam Electric Plant
BTP	Branch Technical Position
BWR	Boiling Water Reactor
BWROG	Boiling Water Reactor Owners Group
BWRVIP	Boiling Water Reactor Vessel and Internals Program
CAP	Corrective Action Program
CCW	Component Cooling Water/Closed Cooling Water
CDD	Condensate Deep Bed Demineralizer
DE	NRC/NRR/Division of Engineering
CFD	Condensate Filter Demineralizer
CHRS	Containment Heat Removal System
DIPM	NRC/NRR/Division of Inspection Program Management
CLB	Current Licensing Basis
CP&L	Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc.
CRD	Control Rod Drive
CRDH	Control Rod Drive Housing
CRDM	Control Rod Drive Mechanism
CS	Core Spray/Carbon Steel
CSCS	Core Standby Cooling System
CST	Condensate Storage Tank
CW	Circulating Water
CUF	Cumulative Usage Factor
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DC	Direct Current

DG	Diesel Generator
DGB	Diesel Generator Building
D/P	Differential Pressure
DSCSS	Drywell and Suppression Chamber Spray System
DWT	Deminerlized Water Tank
EAF	Environmentally Assisted Fatigue
E&RC	Environmental and Radiation Control
ECC	Emergency Core Cooling
ECCS	Emergency Core Cooling System
EFPY	Effective Full Power Years
EHC	Electro-Hydraulic Control
EPRI	Electric Power Research Institute
EPU	Extended Power Uprate
EQ	Environmental Qualification
ESF	Engineered Safety Features
FAC	Flow Accelerated Corrosion
FHA	Fire Hazards Analysis
FO	Fuel Oil
FOST	Fuel Oil Storage Tank
FP	Fire Protection
FPP	Fire Protection Program
FSAR	Final Safety Analysis Report
FW	Feedwater
GALL	Generic Aging Lessons Learned (the GALL Report is NUREG-1801)
GDC	General Design Criteria
GE	General Electric
GL	Generic Letter
GSI	Generic Safety Issue
HELB	High Energy Line Break
HEPA	High Efficiency Particulate Air
HPCI	High Pressure Coolant Injection
HPCS	High Pressure Core Spray (not an applicable system for BSEP)
HVAC	Heating, Ventilating, and Air Conditioning
IA	Instrument Air
IASCC	Irradiation Assisted Stress Corrosion Cracking
I&C	Instrumentation and Control
ID	Inside Diameter
IE	Inspection and Enforcement (former NRC Office of Inspection and Enforcement)
IEEE	Institute Of Electrical And Electronic Engineers
IGSCC	Intergranular Stress Corrosion Cracking
ILRT	Integrated Leak Rate Test (Containment Type A Test)
IN	Information Notice
INPO	Institute Of Nuclear Power Operations
IPA	Integrated Plant Assessment (10 CFR 54.21(a))
ISG	Interim (NRC) Staff Guidance

ISI	In-Service Inspection
KV	Kilovolt
LBB	Leak-Before-Break
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LPCI	Low Pressure Coolant Injection
LPCS	Low Pressure Core Spray
LR	License Renewal
LRA	License Renewal Application
MIC	Microbiologically Induced Corrosion
MS	Main Steam
MSLB	Main Steam Line Break
MSR	Moisture Separator Reheater
MWTS	Makeup Water Treatment System
NDE	Nondestructive Examination
NDTT	Nil-Ductility Transition Temperature
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NPS	Nominal Pipe Size
NRC	Nuclear Regulatory Commission
NRR	NRC/Office of Nuclear Reactor Regulation
NSSS	Nuclear Steam Supply System
NUREG	Designation of publications prepared by the NRC staff
PASS	Post-Accident Sampling System
PCS	Primary Containment Structure
PEC	Progress Energy Carolinas
PFM	Probabilistic Fracture Mechanics
pH	Concentration of Hydrogen Ions
PM	Preventive Maintenance
PNS	Pneumatic Nitrogen System
PORV	Power-Operated Relief Valve
P-T	Pressure-Temperature
PTS	Pressurized Thermal Shock
PVC	Polyvinyl Chloride
PWS	Potable Water System
QA	Quality Assurance
RAI	Request for Additional Information
RBCCW	Reactor Building Closed Cooling Water
RCIC	Reactor Core Isolation Cooling
RCPB	Reactor Coolant Pressure Boundary
RFP	Reactor Feedwater Pump
RG	Regulatory Guide
RHR	Residual Heat Removal
RLEP-B	NTC/NRR/License Renewal and Environmental Impacts Program/Section B

RMS	Radiation Monitoring System
RPV	Reactor Pressure Vessel
RTNDT	Reference Temperature, Nil-Ductility Transition
RTNDT(U)	Reference Temperature, Nil-Ductility Transition (Unirradiated)
RVI	Reactor Vessel Internals
RWCU	Reactor Water Cleanup System
RXS	Reactor Building Sampling System
SA	Service Air
SAT	Startup Auxiliary Transformer
SBO	Station Blackout
SC	Structure/Component (10 CFR 54.21(a)(1)), also Suppression Chamber
SCC	Stress Corrosion Cracking
SCW	Screen Wash Water
SDV	Scram Discharge Volume
SER	Safety Evaluation Report
SFP	Spent Fuel Pool
SGTS	Standby Gas Treatment System
SI	Safety Injection
SLC	Standby Liquid Control
SR	Safety Related
SRP	Standard Review Plan
SRP-LR	Standard Review Plan for License Renewal
SRV	Safety Relief Valve
SS	Stainless Steel
SSC	Systems, Structures, and Components (10CFR 54.4(a))
SW	Service Water
TAC	Technical Assignment Control (internal NRC work management tool)
TB	Turbine Building
TBCCW	Turbine Building Closed Cooling Water
TGSCC	Trans-Granular Stress Corrosion Cracking
TLAA	Time-Limited Aging Analysis
UAT	Unit Auxiliary Transformer
UFSAR	Updated Final Safety Analysis Report
USE	Upper Shelf Energy
UUSE	Unirradiated Upper Shelf Energy
UT	Ultrasonic Test
VAC	Volts alternating current
VDC	Volts direct current