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Pilgrim Audit Team:

Attached is the revised draft of the Pilgrim audit plan for your review and comments.

This document incorporates the NRC comments delivered by Peter Wen and Jim Davis on Thursday 3-30-06.

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**Audit and Review Plan for  
Plant Aging Management Reviews and Programs**

**Pilgrim Nuclear Power Station  
Docket No.: 50-293**

April 4, 2006

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## Audit and Review Plan for Plant Aging Management Reviews and Programs

### 1. INTRODUCTION

By letter dated January 25, 2006 (ADAMS Accession Number ML 060300028), Entergy Nuclear Operations, Inc., submitted to the U.S. Nuclear Regulatory Commission (NRC) its application for renewal of Operating License DPR-35 for Pilgrim Nuclear Power Station (PNPS.) The applicant requested renewal of the operating license for an additional 20 years beyond the 40-year current license term.

In support of the staff's safety review of the license renewal application (LRA) for PNPS, the Division of License Renewal (DLR), Branch C (RLRC), will lead a project team that will audit and review selected aging management reviews (AMRs) and associated aging management programs (AMPs), and time-limited aging analyses (TLAAs) developed by the applicant to support its LRA for PNPS. The project team will include both NRC staff and engineers provided by Advanced Technologies and Laboratories International, Inc. (ATL), RLRC's technical assistance contractor. Appendix A, "Project Team Membership," lists the project team members. This document is the RLRC plan for auditing and reviewing plant aging management reviews and aging management programs for PNPS.

The project team will audit and review its assigned AMPs, AMRs, and TLAAs against the requirements of Title 10 of the Code of Federal Regulations, Part 54 (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants;" the guidance provided in NUREG-1800, Revision 1, "Standard Review Plan for Review of License Renewal Application for Nuclear Power Plants" (SRP-LR), dated September 2005; the guidance provided in NUREG-1801, Revision 1, "Generic Aging Lessons Learned (GALL) Report," dated September 2005; and this plan. For the scope of work defined in this audit plan, the project team will verify that 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 PNPS current licensing basis (CLB) for the period of extended operation.

The team will perform its work at NRC Headquarters, Rockville, Maryland; at ATL's offices in Germantown, Maryland; and at the PNPS site near Plymouth, Massachusetts. The project team will perform its work in accordance with the schedule shown in Appendix B, "Schedule." The team will conduct a public exit meeting at or near the applicant's offices in Plymouth, Massachusetts, after it completes its onsite work.

This plan includes the following information:

- **Introduction and background.** Summary of the license renewal requirements, as stated in the Code of Federal Regulations, and a summary of the documents that the project team will use to conduct the audit and review process described in this plan.
- **Objectives.** The objectives of the audits and reviews addressed by this plan.

- **Summary of Information Provided in License Renewal Application.** Description of the information contained in the license renewal application for PNPS that is applicable to this plan.
- **Overview of the Audit, Review, and Documentation Procedure.** Summary of the process the project team will follow to audit and review the LRA information that is within its scope of review.
- **Planning, Audit, Review, and Documentation Procedure.** The procedure that the project team will use to plan and schedule its work, to audit and review the LRA information that is within its scope of review, and to document the results of its work.
- **Appendices.** Supporting information. The project team membership is shown in Appendix A and the schedule is shown in Appendix B. The team's work assignments are shown in Appendix C, "Aging Management Program Assignments," Appendix D, "Aging Management Review Assignments," Appendix E "Time-Limited Aging Analysis Review Assignments." Appendices F, G, H, and I are the worksheets that the individual team members use to informally document the results of their review and audit work. The application of these worksheets is discussed in Section 6 of this plan. Appendix J is a list of the acronyms, abbreviations, and initialisms used in this plan.

## 2. BACKGROUND

In 10 CFR 54.4, the scope of license renewal is defined as those structures, systems, and components (SSCs) (1) that are safety-related, (2) whose failure could affect safety-related functions, and (3) that are relied on to demonstrate compliance with the NRC'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 period of extended operation. 10 CFR 54.21(d) requires that the applicant submit a supplement to the final safety analysis report (FSAR) 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 applications for license renewal. The GALL Report is a technical basis document. It summarizes staff-approved AMPs for the aging



management of a large number of SCs that are subject to an AMR. It also summarizes the aging management evaluations, programs, and activities acceptable to the NRC staff for managing aging of most of the SCs used in commercial nuclear power plants, and serves as a reference for both the applicant and staff reviewers to quickly identify those AMPs and activities that the staff has determined will provide adequate aging management during the extended period of operation. If an applicant commits to implementing these staff-approved 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 (1) systems, structures, and components, (2) component materials, (3) the environments to which the components are exposed, (4) the aging effects associated with the materials & environments, (5) the AMPs that are credited to manage the aging effects, and (6) recommendations for further applicant evaluations of aging effects and their management for certain component types.

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 confirms 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 onsite in an auditable form.

The SRP-LR also provides staff guidance for reviewing TLAA's. Pursuant to 10 CFR 54.21(c)(1) a license renewal application is required to provide a list of TLAA's, as defined in 10 CFR 54.3. In addition, the applicant must provide a list of plant-specific exemptions granted under 10 CFR 50.12 that are based on TLAA's. The number and type of TLAA's vary depending on the plant-specific CLB.

All six criteria set forth in 10 CFR 54.3 must be satisfied to conclude that a calculation or analysis is a TLAA. Pursuant to 10 CFR 54.3, TLAA's are those licensee calculations and analyses that:

1. Involve systems, structures, and components within the scope of license renewal, as delineated in 10 CFR 54.4(a);
2. Consider the effects of aging:

3. Involve time-limited assumptions defined by the current operating term, for example, 40 years;
4. Were determined to be relevant by the licenses in making a safety determination;
5. Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, or component to perform its intended function(s), as delineated in 10 CFR 54.4(b); and
6. Are contained or incorporated by reference in the CLB.

Finally, the applicant must demonstrate that the TLAA's remain valid for the period of extended operation; the TLAA's have been projected to the end of the period of extended operation; or the aging effects of aging on the intended function(s) will be adequately managed for the period of extended operation. The staff performs a technical review as well as reviews the area relating to the identification of TLAA's. The staff also confirms that the applicant did not omit any TLAA's, as defined in 10 CFR 54.3.

### 3. OBJECTIVES

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

The audit and review procedure for PNPS is described in Sections 5 and 6 of this plan. It is intended to accomplish the following objectives:

- For PNPS AMPs that the applicant claims are consistent with GALL AMPs, verifying that the plant AMPs contain the program elements of the referenced GALL AMP and that the conditions at the plant are bounded by the conditions for which the GALL AMPs were evaluated.
- For PNPS AMPs that the applicant claims are consistent with GALL AMPs with exceptions, verifying that 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, verifying that the applicant has documented an acceptable technical basis for each exception.
- For PNPS AMPs that the applicant claims will be consistent with GALL AMPs after specified enhancements are implemented, verifying that 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, verifying that the applicant identified the

enhancements as commitments in the Updated Final Safety Analysis Report (UFSAR) or other docketed correspondence.

- For plant-specific PNPS AMPs that the applicant claims are consistent with AMPs that the staff has previously approved for another plant, verifying the AMPs are acceptable on the basis of a technical review.
- For AMR line items that the applicant claims are consistent with the GALL Report, determine that these AMR line items are consistent with the recommendation of the GALL Report.
- For AMR line items (Table 1s) that the applicant claims are not applicable with the GALL Report, determine that these AMR line items are acceptable on the basis of a technical review.
- For AMR line items that the applicant claims consistent with AMR line items that the staff has previously approved for another plant, determine that these AMR line items are acceptable on the basis of a technical review.
- For AMR line items for which the GALL Report recommends further evaluation, determine that the applicant has addressed the further evaluation, and evaluating the AMRs in accordance with the SRP-LR.
- For TLAA's, determine that the applicant has properly identified the TLAA's. TLAA's are certain plant-specific safety analyses that are based on explicitly assumed 40-year plant life (for example, aspects of the reactor vessel design). Pursuant to 10 CFR 54.219(c)(1), a license renewal applicant is required to provide a list of TLAA's, as defined in 10 CFR 54.3. The area relating to the identification of TLAA's is reviewed. TLAA's may have developed since issuance of a plant's operating license. As indicated in 10 CFR 54.30, the adequacy of the plant's CLB, which includes TLAA's, is not an area within the scope of the license renewal review. Any question regarding the inadequacy of the CLB must be addressed under the backfit rule (10 CFR 50.109) and is separate from the license renewal process.
- Determine that the applicant has demonstrated that (1) the TLAA's remain valid for the period of extended operation; (2) the TLAA's have been projected to the end of the period of extended operation; or (3) the aging effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

#### **4. SUMMARY OF INFORMATION PROVIDED IN THE LICENSE RENEWAL APPLICATION**

##### **4.1 Aging Management Review Results**

The PNPS 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 6, June 2005. Section 3 of the LRA provides the results of the aging management review for structures and components that the applicant identified as being subject to aging management review.

LRA Table 3.0-1, Table 3.0-2, and Table 3.0-3 provide descriptions of the mechanical, structural, and electrical service environments, respectively, 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 it is a Table 1 type. For example, in the 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. For ease of discussion, these table types will hereafter be referred to as "Table 1." These tables are derived from the corresponding tables in NUREG-1801, Volume 1, and present summary information from the AMRs.

Definition	
1	Reactor Vessel, Internals, and Reactor Coolant System
2	Engineered Safety Features Systems
3	Auxiliary Systems
4	Steam and Power Conversion Systems
5	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 coolant system subsection, the AMR results for the reactor vessel are presented in Table 3.1.2-1, and the results for the reactor vessel internals are in Table 3.1.2-2. In the engineered safety features subsection, the residual heat removal system results are presented in Table 3.2.2-1, and the core spray system is in Table 3.2.2-2. For ease of discussion, these table types will hereafter be referred to as "Table 2." These tables present the results of the AMRs.

#### 4.1.1 PNPS AMR Comparison with GALL

The applicant compared the PNPS AMR results with information set forth in the tables of the GALL Report and provided the results of its comparisons in two table types that correlate with the two table types described above.

To take full advantage of the GALL Report, PNPS AMR results have been compared w/

information set forth in the tables of NUREG-1801. Results of that comparison are provided in the following two table types, Table 1 and Table 2.

#### 4.1.1.1 Purpose of Table 1

The purpose of Table 1 is to provide a summary comparison of how the PNPS AMR results align with the corresponding table of NUREG-1801, Volume 1. These tables are essentially the same as Tables 1 through 6 provided in NUREG-1801, Volume 1, with the following exceptions:

- The ID column is labeled "Item Number" and the spacing has been expanded to include the table number.
- The "Type" column has been deleted. Items applicable to PWRs only are noted as such.
- The "Related Item" column has been replaced by a "Discussion" column.

The "Item Number" column provides a means to cross-reference to Table 1 from the Table 2s.

Further information is provided in the "Discussion" column. The following are examples of information that might be contained within this column:

- Any "Further Evaluation Recommended" information or reference to the location of that information.
- The name of a plant-specific program being used.
- Exceptions to the NUREG-1801 assumptions.
- A discussion of how the line item is consistent with the corresponding line item in NUREG-1801, Volume 1, when it may not be intuitively obvious.
- A discussion of how the line item is different than the corresponding line item in NUREG-1801, Volume 1, when it may appear to be consistent.

#### 4.1.1.2 Purpose of Table 2

Table 2 provides results of the aging management reviews for those structures and components identified in Section 2 as being subject to aging management review. There is a Table 2 for each aging management review within a NUREG-1801 system group. For example, the engineered safety features system group contains tables specific to residual heat removal, core spray, automatic depressurization, high pressure coolant injection, reactor core isolation cooling, standby gas treatment, and primary containment penetrations.

Table 2 consists of the following nine columns:

*Component Type*

Column 1 identifies the component types from Section 2 of this application that are subject to aging management review. Similar to Section 2, component types are listed in alphabetical order. In the Class 1 tables in Section 3.1 and the structural tables in Section 3.5, component types are alphabetical by sub-groups.

The term "piping" in component lists may include pipe, pipe fittings (such as elbows & reducers), flow elements, orifices, and thermowells. If such components have unique tag numbers or the specific component has a function other than pressure boundary, then flow elements, orifices and thermowells are identified as a separate component type.

The term "heat exchanger (shell)" may include the bonnet/channel head and tubesheet. In cases where the bonnet/channel head and tubesheet provide a unique material and environment combination, they will be uniquely identified as a separate component type.

The general component type of "tank" includes components identified as tanks or accumulators on LRA drawings.

*Intended Function*

Column 2 identifies the license renewal intended functions (using abbreviations where necessary) for the listed component types. Definitions and abbreviations of intended functions are listed in Table 2.0-1 in Section 2.

*Material*

Column 3 lists the particular materials of construction for the component type being evaluated.

*Environment*

Column 4 lists the environment to which the component types are exposed. Internal/external service environments are indicated. A description of these environments is provided in Tables 3.0-1, 3.0-2, and 3.0-3 for mechanical, structural, and electrical components, respectively.

*Aging Effect Requiring Management*

Column 5 lists the aging effects requiring management for material and environment combinations for each component type.

*Aging Management Programs (AMP)*

Column 6 lists the programs used to manage the aging effects requiring management.

NUREG-1801, Vol. 2, Item

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Column 7 documents identified consistencies by noting the appropriate NUREG-1801, Volume 2, item number. If there is no corresponding item number in NUREG-1801, Volume 2, for a particular combination of factors, column 7 is left blank.

Each combination of the following factors listed in Table 2 is compared to NUREG-1801, Volume 2, to identify consistencies:

- Component type.
- Material.
- Environment.
- Aging effect requiring management.
- Aging management program.

*Table 1 Item*

Column 8 lists the corresponding line item from Table 1. If there is no corresponding item in NUREG-1801, Volume 1, column 8 is left blank.

Each combination of the following that has an identified NUREG-1801, Volume 2 item number also has a Table 1 line item reference number:

- Component type.
- Material.
- Environment.
- Aging effect requiring management.
- Aging management program.

*Notes*

Column 9 contains notes that are used to describe the degree of consistency with the line items in NUREG-1801, Volume 2. 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). Notes that use numeric designators are specific to PNPS.

PNPS LRA Table 2 contains the aging management review results and indicates whether the results correspond to line items in Volume 2 of the GALL Report. Correlations between the combination PNPS LRA Table 2 and a combination for a line item in Volume 2 of the GALL Report are identified by the GALL Report item number in Column 7. 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, the next column 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.

#### 4.1.2 Plant-Specific Programs

Many of the GALL Report evaluations refer to plant-specific programs. In these cases, the applicant considers the PNPS evaluation to be consistent with the GALL Report if the other elements are consistent. Any appropriate AMP is considered to be a match to the GALL program for line items referring to a plant-specific program.

#### 4.2 Time-Limited Aging Analyses

The PNPS LRA closely follows the standard LRA format presented in Revision 6 of NEI 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule." Section 4 of the PNPS LRA addresses time-limited aging analyses. In Section 4.1.1, the PNPS LRA states that the calculations and evaluations that could potentially meet the six criteria of 10 CFR 54.3 were identified by searching CLB documents including the following:

- A. Technical Specifications
- B. UFSAR
- C. docketed licensing correspondence
- D. fire protection program documents
- E. NRC safety evaluation reports
- F. BWRVIP documents

In Section 4.1, the PNPS LRA states that as required by 10 CFR 54.21(c)(1), an evaluation of PNPS-specific time-limited aging analyses must be performed to demonstrate that:

- A. The analyses remain valid for the period of extended operation;
- B. The analyses have been projected to the end of the period of extended operation; or
- C. The effects of aging on the intended functions(s) will be adequately managed for the period of extended operation.

In the PNPS LRA, the applicant summarized the results of the above evaluations in Table 4.1-1. These evaluations are discussed in subsequent sections of PNPS LRA Section 4.

Following the section identifying the TLAAs, the PNPS LRA next includes a section identifying any exemptions. Section 10 CFR 54.21(c) also requires that the application for a renewed license includes a list of plant-specific exemptions granted pursuant to 10 CFR 50.12 and in effect that are based on time-limited aging analyses as defined in 10 CFR 54.3. The PNPS performed this by reviewing PNPS docketed correspondence which identified PNPS exemptions. The results of this review determined that no PNPS exemptions depend on TLAAs.



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The PNPS LRA next includes a separate section for each of the identified TLAA's within the outline of the corresponding NUREG-1800 TLAA category. The TLAA categories are outlined in the next table.

TLAA Description	Resolution Option	Section
<b>Reactor Vessel Neutron Embrittlement Analyses</b>		<b>4.2</b>
Pressure-temperature limits	Analyses remain valid 10 CFR 54.21(c)(1)(i)	4.2.2
Charpy upper-shelf energy	Analyses projected 10 CFR 54.21(c)(1)(ii)	4.2.3
Adjusted reference temperature	Analyses projected 10 CFR 54.21(c)(1)(ii)	4.2.4
Reactor vessel circumferential welds inspection relief	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.2.5
Reactor vessel axial welds failure probability	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.2.6
<b>Metal Fatigue Analyses</b>		<b>4.3</b>
Class 1 fatigue	Analyses remain valid 10 CFR 54.21(c)(1)(i) OR Aging effect managed 10 CFR 54.21(c)(1)(iii)	4.3.1
Non-Class 1 fatigue	Analyses remain valid 10 CFR 54.21(c)(1)(i)	4.3.2
Effects of reactor water environment on fatigue life	Analyses remain valid 10 CFR 54.21(c)(1)(i) OR Analyses projected 10 CFR 54.21(c)(1)(ii) OR Aging effect managed 10 CFR 54.21(c)(1)(iii)	4.3.3
Environmental Qualification Analyses for Electrical Equipment	Aging effect managed 10 CFR 54.21(c)(1)(iii)	4.4
<b>Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses</b>		<b>4.6</b>
Fatigue of primary containment	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.6.1

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TLAA Description	Resolution Option	Section
Other TLAA		4.7
Reflood thermal shock of the reactor vessel internals	Analysis remains valid 10 CFR 54.21(c)(1)(i)	4.7.1
TLAA in BWRVIPs		4.7.2
BWRVIP-05, RPV circumferential welds analysis	Addressed in Sections 4.2.5	4.7.2.1
BWRVIP-48, vessel ID attachment welds fatigue analysis	Analysis remains valid 10 CFR 54.21(c)(1)(ii)	4.7.2.2
BWRVIP-49, instrument penetrations fatigue analysis	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.7.2.3
BWRVIP-74, reactor vessel P/T curves analysis Fatigue analysis C <sub>0</sub> USE analysis Circ/Axial welds analysis	Addressed in Section 4.2.2 Addressed in Section 4.3.1 Addressed in Section 4.2.3 Addressed in Sections 4.2.5 and 4.2.6	4.7.2.4
BWRVIP-76, core shroud fatigue analysis	Analysis remains valid 10 CFR 54.21(c)(1)(ii)	4.7.2.5

## 5. OVERVIEW OF AUDIT, REVIEW, AND DOCUMENTATION PROCEDURE

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

### 5.1 Aging Management Programs

Table 1 of this audit and review plan summarizes the program elements that comprise an aging management program. For the PNPS AMPs for which the applicant claimed consistency with the AMPs included in the GALL Report, the project team will review the PNPS AMP descriptions and compare program elements for the PNPS AMPs to the corresponding program elements for the GALL AMPs. The project team will verify that the PNPS AMPs contain the program elements of the referenced GALL program and that the conditions at the plant are bounded by the conditions for which the GALL program was evaluated. The Division of Engineering will review and determine the adequacy of the applicant's 10 CFR 50, Appendix B Program. Other aspects of these program elements will be reviewed by the project team.

For PNPS AMPs that have one or more exception and/or enhancement, the project team will review each exception and/or enhancement to determine whether the exception and/or enhancement is acceptable, and whether the AMP, as modified by the exception and/or the

enhancement, would adequately manage the aging effects for which it is credited. In some cases, the project team will identify differences that the applicant did not identify between the PNPS AMPs credited by the applicant and the GALL Report AMPs. In these cases, the project team will review the difference to determine whether the PNPS AMP, as modified by the difference, would adequately manage the aging effects for which it is credited.

For those PNPS AMPs that are not included in the GALL Report (i.e., plant-specific AMPs), the project team will review the AMP against the ten program elements defined in Appendix A of the SRP-LR. The Division of Engineering will review and determine the adequacy of the applicant's 10 CFR 50, Appendix B Program. Other aspect of these program elements will be reviewed by the project team. On the basis of its reviews, the project team will determine whether these AMPs will 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 its 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 recommended further evaluation.

## **5.3 Time-Limited Aging Analyses**

The TLAAs in the PNPS LRA fall into the broad category of those that are consistent with the NUREG-1800 TLAA categories. There are no plant-specific exemptions identified in the VYNPS LRA that depend on time-limited aging analyses.

For its TLAA reviews, the project team will determine if the applicant had provided adequate information to meet the requirements of 10 CFR 54.21(c)(1) and 10 CFR 54.21(c)(2).

Further, the project team will conduct both regulatory evaluations and technical evaluations to determine, as defined in 10 CFR 54.3, that each TLAA meets the following six criteria:

1. involve systems, structures, and components that are within the scope of license renewal, as delineated in 10 CFR 54.4(e).
2. consider the effects of aging.

3. involve time-limited assumptions defined by the current operating term (40 years).
4. determined to be relevant by the applicant in making a safety determination.
5. involve conclusions, or provide the basis for conclusions, related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b).
6. are contained or incorporated by reference in the CLB.

In addition, the project team will also review the TLAA's to determine if there are emerging issues that should be further evaluated by technical specialists in the NRC Divisions of Component Integrity (DCI) or the Division of Engineering (DE). This is not expected to be an issue for TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(i) "the analyses remain valid for the period of extended operation" or 10 CFR 54.21(c)(iii) "the effects of aging on the intended function(s) will be adequately managed for the period of extended operation."

For TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(ii) - "the analyses have been projected to the end of the period of extended operation," the audit team leader will be consulted to determine which TLAA's the audit team will be capable of reviewing. Consideration should be given to project team expertise, past precedent, and complexity of the provided analysis. Candidates for further review by technical specialists could be such as the following:

- A. Reactor Vessel Neutron Embrittlement Analysis
- B. Intergranular separation in the Heat-Affected Zone (HAZ) of Reactor Vessel
- C. Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses
- D. Low-Alloy Steel under Austenitic SS Cladding

#### 5.4 NRC-Approved Precedents

To help facilitate the staff review of its LRA, the applicant referenced NRC-approved precedents to demonstrate that certain non-GALL AMPs correspond to programs that the staff had approved for other plants during its review of previous applications for license renewal. Using the precedent information, the project team will (1) determine whether the material presented in the precedent is applicable to the applicant's facility, (2) determine whether the applicant's AMP is bounded by the conditions for which the precedent was evaluated and approved, and (3) verify that the applicant's AMP contains the program elements of the referenced precedent. In general, if the project team determines that these conditions are satisfied, it will use the precedent to frame and focus its review of the applicant's AMP.

It is important to note that **precedent information is not a part of the license renewal application**; it is supplementary information voluntarily provided by the applicant as a reviewers' aid. The existence of a precedent, in and of itself, is not a sufficient basis to accept the applicant's AMP. Rather, the precedent facilitates the review of the substance of the matters described in the applicant's AMP. As such, in the project team's documentation of its reviews of

AMPs that are based on precedents, the precedent information is typically implicit in the evaluation, rather than explicit. If the project team determines that a precedent identified by the applicant is not applicable to the particular plant AMP for which it is credited, then the project team reviews the AMP as a plant-specific AMP without consideration of the precedent information.

### **5.5 UFSAR Supplement Review**

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 verify that they are acceptable for the stated purpose.

### **5.6 Documents Reviewed by the Project Team**

In performing its work, the project team will rely heavily on the LRA, the audit and review plan, the SRP-LR, and the GALL Report. The project team will also examine the applicant's precedent review documents, its AMP, AMR, and TLAA basis documents (catalogs of the documentation used by the applicant to develop or justify its AMPs, AMRs, and TLAAs), and other applicant documents, including selected implementing procedures, to verify that the applicant's activities and programs will adequately manage the effects of aging on structures and components.

### **5.7 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.

### **5.8 Documentation Prepared by the Project Team**

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

#### **5.8.1 Audit and Review Plan**

The project team leader will prepare a plant-specific audit and review plan as described herein.

#### **5.8.2 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", and Appendix H, "TLAA-Audit/Review Worksheet." The use of the worksheets is described in Section 6 of this plan.

#### 5.8.3 Questions

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

#### 5.8.4 Work Packages

After each site visit, the project team leader, in conjunction with the project manager, will assemble work packages for any work that the 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 on the review item that was gathered by the project team.

#### 5.8.5 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 team leader will provide the response to the team member who prepared the RAI. The team member will review the response and determine if it resolves the issue that was the reason for the RAI. The team member will document the disposition of the RAI in the audit and review 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.

#### 5.8.6 Audit and Review Report

The project team will document the results of its work in an audit and review report. The team will prepare its report as described in Section 6.4.1 of this plan and the latest version of the RLRC Guidelines For Preparing Audit and Review Reports.

#### 5.8.7 Safety Evaluation Report input

The project team will prepare SER input, based on the audit and review report, as described in

Section 6.4.2 of this plan.

## **6. PLANNING, AUDIT, REVIEW, AND DOCUMENTATION PROCEDURE**

This section of the audit and review 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 team leader will establish the schedule for the key milestones and activities, consistent with the overall schedule for making the licensing decision. Key milestones and activities include, as a minimum:

- Receiving the LRA from the applicant.
- Receiving work split tables from the project manager.
- Making individual work assignments.
- Training project team members.
- Holding the project team kickoff meeting.
- Preparing the audit and review plan.
- Scheduling site visits.
- Scheduling in-office review periods.
- Preparing questions.
- Preparing RAIs.
- Preparing draft and final audit and review report.
- Preparing draft and final SER input.

Site visits will be scheduled on the basis of discussions between the project team leader, the NRC license renewal project manager, and the applicant.

Appendix B of this plan contains the target schedule for the key milestones and activities.

#### **6.1.2 Work Assignments**

The technical assistance contractor will propose team member work assignments to the NRC project team leader. The NRC project team leader will approve all work assignments. After the audit plan is issued, the team leader may reassign work as necessary.

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

### 6.1.3 Training and Preparation

The training and preparation will include the following:

- A. A description of the audit and review process.
- B. An overview of audit/review-related documentation and the documentation that the project team will audit and review.
  - 1. GALL Report
  - 2. SRP-LR
  - 3. Interim Staff Guidance for License Renewal (ISG-LR)
  - 4. LRA AMPs
  - 5. LRA AMRs
  - 6. Basis documents (catalogues of information assembled by the applicant to demonstrate the bases for its programs and activities)
  - 7. Implementing procedures
  - 8. Operating experience reports
  - 9. RAIs, audit reports, and SERs for other plants
  - 10. Applicant's UFSAR
  - 11. LRA TLAAs
- C. The protocol for interfacing with the applicant.
- D. Administrative issues such as travel, control of documentation, work hours, etc.
- E. Process for preparing questions, RAIs, the audit and review report, and SER input.
- F. Process for interfacing with DE technical reviewers.

## 6.2 Aging Management Program (AMP) Audits and Reviews

### 6.2.1 Types of AMPs

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.

### 6.2.2 Scope of AMP elements to be audited and reviewed

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 program elements audited or reviewed is the same for both AMPs that are consistent with the GALL Report and for plant-specific AMPs. The Division of Engineering will review and determine the adequacy of the applicant's 10 CFR 50, Appendix B Program. Other aspects of these program elements will be reviewed by the project team.

### 6.2.3 Plant AMPs that Are Consistent with the GALL Report

Figure 1, "Audit of AMPs that Are Consistent with the GALL Report," is the process flowchart that 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.

#### Preparation

- A. For the plant AMP being reviewed, identify the corresponding GALL AMP.
- B. Review the associated GALL AMP and identify those elements that will be audited.
- C. Identify the documents needed to perform the audit. These may include, but are not limited to, the following:
  1. GALL Report
  2. SRP-LR
  3. ISGs
  4. RAIs and SERs for similar plants
  5. LRA
  6. Basis documents
  7. Implementation procedures
  8. Operating experience reports (plant-specific and industry)
  9. UFSAR

#### Audit/Review

- A. Confirm that PNPS AMP program elements are consistent with the corresponding elements of the GALL Report AMP by answering the following questions and then following the process shown in Figure 1.
  1. Did the applicant identify any exceptions to the GALL Report AMP?
  2. Did the applicant identify any enhancements to the GALL Report AMP?
  3. Are the elements consistent with the GALL Report AMP?
- B. If either of the above questions results in the identification of an exception/enhancement or a difference to the GALL AMP, determine whether it is acceptable on the basis of an "adequate technical justification."
- C. If an acceptable basis exists for an exception/enhancement or difference, document the

basis in the worksheet and later in the audit and review report and the SER input.

- D. Review the industry and plant-specific operating experience associated with the AMP. The review is to identify aging effects requiring management that are not identified by the industry guidance documents (such as EPRI tools) and to confirm the effectiveness of aging management programs. The project team members should consider the industry guidance when assessing operating experience and formulating questions for the applicant. The industry guidance (from NEI 95-10, Revision 6) is as follows:
  1. Plant-Specific Operating Experience with Aging Effects Requiring Management. A plant-specific operating experience review should assess the operating and maintenance history. A review of the prior 5 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.
  2. Plant-Specific Operating Experience with existing Aging Management Programs. The operating experience of AMPs, including 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.
  3. 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, a generic letter, 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 an already identified aging effect.
- E. If it is necessary to ask the applicant a question to clarify the basis for accepting a program element, or an exception or a difference to the GALL Report AMP, follow the logic process shown in Figure 1.
- F. If it is necessary for the applicant to submit additional information to support the basis for accepting the justification, an exception, or a difference to a program element, the applicant may agree to voluntarily submit the required information as a supplement (docketed letter submitted under oath and affirmation) to the LRA. If not, the NRC may issue an RAI to obtain the information.

AMP audit worksheets

Document the audits/reviews using the worksheet provided in Appendix E, "Consistent with GALL Report AMP Audit/Review Worksheet."

## 6.2.4 Plant-Specific AMPs

Figure 2, "Audit of Plant-Specific AMPs," is the process flowchart that shows the activities and decisions used to audit/review each plant-specific AMP.

Pre-review preparation

- A. Review Section A.1.2.3 of the SRP-LR and identify those element criteria that will be reviewed.
- B. Identify the documents needed to perform the audit. These may include, but are not limited to, the following:
  - 1. GALL Report
  - 2. SRP-LR
  - 3. ISG-LR
  - 4. RAIs and SERs for similar plants
  - 5. LRA
  - 6. Basis documents
  - 7. Implementation procedures
  - 8. Operating experience reports (plant-specific and industry)
  - 9. UFSAR
  - 10. Lessons Learned Developed by RLRC

Audit/Review

- A. Audit/review the PNPS AMP program elements and determine that they are in accordance with the acceptance criteria for the corresponding program elements of Section A.1.2.3 of the SRP-LR.
- B. Review the industry and plant-specific operating experience associated with the AMP. This is an area of review emphasis. They require review to identify aging effects requiring management that are not identified by the industry guidance documents (such as EPRI tools) and to confirm the effectiveness of aging management programs. The project team members should consider the industry guidance when assessing operating experience and formulating questions for the applicant. The industry guidance (from NEI 95-10, Revision 6) is as follows:
  - 1. *Plant-Specific Operating Experience with Aging Effects Requiring Management.* The review should assess the operating and maintenance history. A review of the prior 5

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.

2. Plant-Specific Operating Experience with Aging Management Programs. 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.
  3. 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, a generic letter, 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 an already identified aging effect.
- C. If it is necessary to ask the applicant a question, follow the process shown in Figure 2.
- E. If it is necessary for the applicant to submit additional information to resolve a question or an issue or to support the basis or conclusion, the applicant may voluntarily submit the information as a supplement (docketed letter submitted under oath and affirmation) to the LRA. If not, the NRC may issue an RAI to obtain the information.

#### AMP review worksheets

Document the audit/review using the worksheet provided in Appendix F, "Plant-Specific AMP Audit/Review Worksheet."

### **6.3 Aging Management Review (AMR) Audits and Reviews**

There are two types of AMRs: those that the applicant claims are consistent with the GALL Report, and those that are plant-specific. Audit and review of both types of AMRs are discussed below.

#### **6.3.1 Plant AMRs that Are Consistent with the GALL Report**

Figure 3, "Review of AMRs that Are Consistent with the GALL Report," is the process flowchart that shows the activities and decisions used to audit/review each AMR that the applicant claims is consistent with the GALL Report.

#### Preparation

- A. For the PNPS AMRs that the applicant claims are consistent with the GALL Report, identify the corresponding AMRs in Volume 2 of the GALL Report.
- B. Review the associated GALL AMRs and identify those line items that will be audited/reviewed in conjunction with each of the PNPS AMRs.
- C. Identify the documents needed to perform the review. These may include, but are not limited to, the following:
  1. GALL Report
  2. SRP-LR
  3. ISG-LR
  4. RAIs and SERs for similar plants
  5. LRA
  6. Basis documents
  7. Implementation procedures
  8. Operating experience reports (plant-specific and industry)
  9. UFSAR
  10. Lessons Learned Developed by RLRC

#### Audit/Review

- A. Each AMR line item is coded with a letter which represents a standard note designation.<sup>1</sup> The letter notes are described in Table 2 of this plan. Notes that use numeric designators are plant-specific. The note codes A through E are classified as "consistent with the GALL Report," and will be reviewed in accordance with the guidance contained in this plan.
- B. The AMR review involves verification that the applicant has satisfied the requirements of 10 CFR 54.21(a)(3). This requirement states: "For each structure and component ... [within the scope of this part ... and ... subject to an aging management review] (the applicant) demonstrate(s) that the effects of aging will be adequately managed so that

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<sup>1</sup> The AMR line item letter notes are 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 in the format of the standardized format for LRAs by letter dated April 7, 2003, from P.T. Kuo, NRC, to A. Nelson, NEI (ML030990052).

the intended function(s) will be maintained consistent with the CLB for the period of extended operation."

C. Determine compliance by following the process shown in Figure 3. The process is summarized below:

1. For each AMR line item, perform the review associated with the letter note (A through E) assigned to the AMR line item. Specifically, determine if the AMR is consistent with the GALL Report for the elements associated with its note.
2. If Note A applies, and the applicant uses a plant-specific AMP<sup>2</sup> 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.
3. If Note B applies, review the LRA exceptions and document the basis for acceptance in the worksheet, and later in the audit and review report. If not acceptable, go to Step (7) below.
4. If Note C or D applies, determine if the component type is acceptable for the material, environment, and aging effect. If Note D applies, also review the LRA exceptions and document the basis for acceptance in the worksheet, and later in the audit and review report. If not acceptable, go to Step (7) below.
5. If Note E applies, review the AMP audit report findings to determine if the scope of the alternate AMP envelopes the AMR line item being reviewed and satisfies 10 CFR 54.21(a)(3). If it does not, go to Step (7) below.
6. Review the corresponding LRA Table 3.X.1 entry that is referenced in LRA Table 3.X.2.Y. If applicable, 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. If not, go to Step (7) below. If the LRA section does not meet the acceptance criteria of Appendix A of the SRP-LR, go to Step (7) below.
7. If during the review a difference is identified, prepare a question to the applicant, in order to obtain clarification.
  - a. Review the applicant's response to the question. If it appears acceptable, re-start the audit/review for the AMR line item from Step (1) above.

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<sup>2</sup> 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 period of extended operation.

- b. If the applicant's response does not resolve the question or issue, prepare an additional question to obtain the information needed to achieve resolution. Review the applicant's response to the second question. If it appears acceptable, re-start the audit/review for the AMR line item from Step (1) above.
  - c. If it is necessary for the applicant to submit additional information to resolve a question or an issue or to support a basis or conclusion, the applicant may submit the information as a supplement to the LRA or the NRC may issue an RAI to obtain the information. The team leader should be consulted if docketed information may be needed.
8. view LRA Table 3.X.1. for AMR line items (Table 1s) that the applicant claims are not applicable with the GALL Report, determine that the AMR line items are acceptable on the basis of a technical review.

#### AMR audit/review worksheets

Document the audits/reviews of plant AMRs using the worksheet provided in Appendix G, "Aging Management Review Worksheets."

#### 6.3.2 AMRs Based on NRC-Approved Precedents

Figure 4, "AMR Review Using NRC-Approved Precedent," is the process flowchart that shows the activities and decisions used to review plant AMRs that the applicant has identified as being consistent with an NRC-approved precedent.<sup>3</sup>

#### Preparation

Identify the documents needed to perform the audit/review. These may include, but are not limited to, the following:

1. GALL Report
2. SRP-LR
3. ISG-LR
4. RAIs and SERs for similar plants
5. LRA
6. Basis documents
7. Implementation procedures
8. Operating experience reports (plant-specific and industry)
9. UFSAR

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<sup>3</sup> Applicant-identified NRC-approved precedents are only to be used as an aid for performing AMR audits. The audit conclusions will be based on the technical basis of the AMR and its applicability to the plant being reviewed. It is not acceptable to simply cite the NRC-approved precedent as its basis.

## 10. Lessons Learned Developed by RLRC

### Audit/Review

- A. The AMR audit/review involves verification that the requirements of 10 CFR 54.21(a)(3) are satisfied. This criterion states that, "For each structure and component [within the scope of license renewal], demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation."
- B. For AMRs with an NRC-approved precedent, this may be achieved by answering the following questions while following the assessment process shown in Figure 4.
  1. Is the precedent appropriate for the LRA AMR being reviewed?
  2. Is the NRC-approved precedent sufficiently documented or understood to technically support the adequacy of the LRA AMR being reviewed?
  3. Is the LRA AMR within the bounds of the chosen NRC-approved precedent?
  4. If any of these questions results in a "No" answer, then additional information is required to make a determination that the AMR is acceptable.
  5. If it is necessary to ask the applicant a question to obtain clarification on the basis for accepting the AMR, the process shown in Figure 4 should be used.
  6. If it is necessary for the applicant's response to be docketed as a basis for accepting the exception or difference, the applicant may voluntarily docket the response or the NRC may issue an RAI.

### AMR audit/review worksheets

Document the audits/reviews using the worksheet provided in Appendix G, "Aging Management Review Worksheets."

## 6.4 Time-Limited Aging Analyses (TLAA) Audits and Reviews

Audit and review of TLAA's are discussed below. The project team will also review the TLAA's to determine if there are emerging issues that should be further evaluated by technical specialists in the NRC Divisions of Component Integrity (DCI) or the Division of Engineering (DE). In general, the project team will review TLAA's that are for which the applicant claims consistency with 10 CFR 54.21(c)(i) "the analyses remain valid for the period of extended operation." or 10 CFR 54.21(c)(iii) "the effects of aging on the intended function(s) will be adequately managed for the period of extended operation." For TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(ii) - "the analyses have been projected to the end of the period of extended operation," the audit team leader will be consulted to determine which TLAA's the audit team will



be capable of reviewing. Consideration should be given to team expertise, past precedent, and complexity of the provided analysis.

#### 6.4.1 Identify Generic TLAA Issues

Figure 5, "Evaluation of TLAAs and Exemptions," taken from NEI 95-10, Revision 6, shows the process of evaluating and reviewing TLAAs and also identifying the exemptions in effect. This process flowchart shows the activities and decisions used to audit/review each TLAA that the applicant identifies.

#### Pre-Review Preparation

- A. For the PNPS TLAAs that the applicant has identified as generic TLAA issues, identify the corresponding TLAAs in NUREG-1800, if appropriate.
- B. Review the corresponding TLAAs in NUREG-1800 and identify those that will be audited/reviewed in conjunction with each of the PNPS TLAAs.
- C. Review the list of the PNPS plant-specific exemptions granted pursuant to §50.12 and in effect that are based on TLAAs as defined in §54.3. The application shall include an evaluation that justifies the continuation of these exemptions for the period of extended operation.
- D. Identify and locate the documents needed to perform the review. These may include, but are not limited to, the following:
  1. Excel database on TLAAs summarizing how earlier LRAs and SERs presented and reviewed
  2. TLAAs
  3. GALL Report
  4. SRP-LR
  5. ISG-LR
  6. RAIs, audit and review reports, and SERs for similar plants
  7. LRA
  8. References listed by applicant for each TLAA
  9. NEI 95-10, Section 5.1 and Table 6.2-2
  10. basis documents

11. implementation documents
12. operating experience reports (plant-specific and industry)
13. lessons learned developed by RLRC
14. applicant's UFSAR

E. In addition, the project team will also review the TLAA's to determine if there are emerging issues that should be further evaluated by technical specialists in the NRC Divisions of Component Integrity (DCI) or the Division of Engineering (DE). This is not expected to be an issue for TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(i) "the analyses remain valid for the period of extended operation." or 10 CFR 54.21(c)(iii) "the effects of aging on the intended function(s) will be adequately managed for the period of extended operation." For TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(ii) - "the analyses have been projected to the end of the period of extended operation," the audit team leader will be consulted to determine which TLAA's the audit team will be capable of reviewing. Consideration should be given to team expertise, past precedent, and complexity of the provided analysis. Candidates for further review by technical specialists could be such as the following:

1. Reactor Vessel Neutron Embrittlement Analysis (PNPS LRA Section 4.2)
2. Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses (PNPS LRA Section 4.6)
3. Reflood Thermal Shock Analyses of the Reactor Vessel Internals (PNPS LRA Section 4.7.1)

#### Audit/Review

- A. Confirm that each PNPS TLAA listed in this section is appropriate. Refer to any analyses and evaluations created during the acceptance review process.
- B. If a TLAA is listed in the SRP-LR or NEI 95-10 and not in its LRA, the PNPS should state in this section that it does not apply.
- C. Review any industry and plant-specific operating experience associated with the TLAA. This is an area of review emphasis. The project team members should consider the following industry guidance (from NEI 95-10, Table 6.2-2) as follows:
  1. The application shall include a list of time-limited aging analyses, as defined by §54.3. The application should include the identification of the affected systems, structures, and components, an explanation of the time dependent aspects of the calculation or analysis, and a discussion of the TLAA's impact on the associated aging effect. The

identification of the results of the time-limited aging analysis review, which may be provided in tabular form, may reference the section in the Integrated Plant Assessment-Aging Management Review chapter where more details of the actual review and disposition (as required by §54.21(c)(1)(i)-(iii)) are located.

2. The application shall include a demonstration that (1) the analyses remain valid for the period of extended operation, (2) the analyses have been (or have been identified and will be [§54.29(a)]) projected to the end of the period of extended operation or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.
  3. The application shall include a list of plant-specific exemptions granted pursuant to §50.12 and in effect that are based on TLAAAs as defined in §54.3. The application shall include an evaluation that justifies the continuation of these exemptions for the period of extended operation.
  4. Summary descriptions of the evaluations of TLAAAs for the period of extended operation shall be included in the UFSAR supplement (Appendix A).
- D. If it is necessary to ask the applicant a question to clarify the basis for their analyses, follow the logic process shown in Figure 5 of this audit and review plan.
- E. If it is necessary for the applicant to submit additional information to support the basis for the conclusions in their TLAA, the applicant may agree to voluntarily submit the required information as a supplement (docketed letter submitted under oath and affirmation) to the PNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using the worksheet provided in Appendix I, "TLAA Audit/Review Worksheet."

#### 6.4.2 Metal Fatigue Analyses

Figure 5, "Evaluation of TLAAAs and Exemptions," taken from NEI 95-10, Revision 6, shows the process of evaluating and reviewing TLAAAs and also identifying the exemptions in effect. This process flowchart shows the activities and decisions used to audit/review each TLAA that the applicant identifies.

#### Pre-Review Preparation

- A. The project team will determine if the TLAAAs identified in the PNPS LRA to be within the NUREG-1800 TLAA category of "metal fatigue" have provided adequate information to meet the requirements of 10 CFR 54.21(c)(1) and 10 CFR 54.21(c)(2).

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- B. Identify and locate the documents needed to perform the review. These may include, but are not limited to, the following:
1. Excel database on TLAA's summarizing how earlier LRAs and SERs presented and reviewed TLAA's
  2. GALL Report, especially Section X.M1
  3. SRP-LR
  4. ISG-LR
  5. RAIs, audit and review reports, and SERs for similar plants
  6. LRA
  7. References listed by applicant for each TLAA
  8. NEI 95-10, Section 5.1 and Table 6.2-2
  9. basis documents
  10. implementation documents
  11. operating experience reports (plant-specific and industry)
  12. lessons learned developed by RLRC
  13. applicant's UFSAR
- C. In addition, the project team will also review the PNPS TLAA's within the NUREG-1800 TLAA category of "metal fatigue" to determine if there are emerging issues that should be further evaluated by technical specialists in the NRC Divisions of Component Integrity (DCI) or the Division of Engineering (DE). This is not expected to be an issue for TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(i) "the analyses remain valid for the period of extended operation." or 10 CFR 54.21(c)(iii) "the effects of aging on the intended function(s) will be adequately managed for the period of extended operation." For TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(ii) - "the analyses have been projected to the end of the period of extended operation," the audit team leader will be consulted to determine which TLAA's the audit team will be capable of reviewing. Consideration should be given to team expertise, past precedent, and complexity of the provided analysis.

Audit/Review

- A. Confirm that each PNPS TLAA listed in this section is appropriate. Refer to any analyses and evaluations created during the acceptance review process.

- B. If a TLAA is listed in the SRP-LR or NEI 95-10 and not in its LRA, the PNPS should state in this section that it does not apply.
- C. The project team will conduct both regulatory evaluations and technical evaluations to determine, as defined in 10 CFR 54.3, that each TLAA meets the following six criteria:
1. involve systems, structures, and components that are within the scope of license renewal, as delineated in 10 CFR 54.4(a)
  2. consider the effects of aging
  3. involve time-limited assumptions defined by the current operating term (40 years)
  4. are determined to be relevant by the applicant in making a safety determination
  5. involve conclusions, or provide the basis for conclusions, related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b)
  6. are contained or incorporated by reference in the CLB
- D. The project team will ascertain that the PNPS satisfactorily demonstrates that (1) the analyses remain valid for the period of extended operation, (2) the analyses have been (or have been identified and will be [§54.29(a)]) projected to the end of the period of extended operation or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.
- E. Review any industry and plant-specific operating experience associated with the TLAA. This is an area of review emphasis. The project team members should consider the following industry guidance on metal fatigue (from NEI 95-10, Table 6.2-2) as follows:
1. Disposition chosen for each of the identified TLAA's. Also, provide a reference to the summary description of TLAA evaluations in the FSAR supplement (Appendix A). Use hypertext to link to the appropriate location in the appendix for electronic submittals [§54.21(c)(1) and §54.21(d)1].
- F. If it is necessary to ask the applicant a question to clarify the basis for their analyses, follow the logic process shown in Figure 5 of this audit and review plan.
- G. If it is necessary for the applicant to submit additional information to support the basis for the conclusions in their TLAA, the applicant may agree to voluntarily submit the required information as a supplement (docketed letter submitted under oath and affirmation) to the PNPS LRA. If not, the NRC may issue an RAI to obtain the information.

TLAA Audit Worksheets

Document the audits/reviews using the worksheet provided in Appendix I, "TLAA Audit/Review Worksheet."

#### 6.4.3 Environmental Qualification Analyses for Electrical Components

Figure 5, "Evaluation of TLAAs and Exemptions," taken from NEI 95-10, Revision 6, shows the process of evaluating and reviewing TLAAs and also identifying the exemptions in effect. This process flowchart shows the activities and decisions used to audit/review each TLAA that the applicant identifies.

#### Pre-Review Preparation

- A. The project team will determine if the TLAAs identified in the PNPS LRA to be within the NUREG-1800 TLAA category of "environmental qualification of electric equipment" have provided adequate information to meet the requirements of 10 CFR 54.21(c)(1) and 10 CFR 54.21(c)(2).
- B. Identify and locate the documents needed to perform the review. These may include, but are not limited to, the following:
  1. Excel database on TLAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAs
  2. GALL Report, especially Section X.E1
  3. SRP-LR
  4. ISG-LR
  5. RAIs, audit and review reports, and SERs for similar plants
  6. LRA
  7. References listed by applicant for each TLAA
  8. NEI 95-10, Section 5.1 and Table 6.2-2
  9. basis documents
  10. implementation documents
  11. operating experience reports (plant-specific and industry)
  12. lessons learned developed by RLRC
  13. applicant's UFSAR

- C. In addition, the project team will also review the PNPS TLAA's within the NUREG-1800 TLAA category of "environmental qualification of electric equipment" to determine if there are emerging issues that should be further evaluated by technical specialists in the NRC Divisions of Component Integrity (DCI) or the Division of Engineering (DE). This is not expected to be an issue for TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(i) "the analyses remain valid for the period of extended operation," or 10 CFR 54.21(c)(iii) "the effects of aging on the intended function(s) will be adequately managed for the period of extended operation." For TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(ii) - "the analyses have been projected to the end of the period of extended operation," the audit team leader will be consulted to determine which TLAA's the audit team will be capable of reviewing. Consideration should be given to team expertise, past precedent, and complexity of the provided analysis.

#### Audit/Review

- A. Confirm that each PNPS TLAA listed in this section is appropriate. Refer to any analyses and evaluations created during the acceptance review process.
- B. If a TLAA is listed in the SRP-LR or NEI 95-10 and not in its LRA, the PNPS should state in this section that it does not apply.
- C. The project team will conduct both regulatory evaluations and technical evaluations to determine, as defined in 10 CFR 54.3, that each TLAA meets the following six criteria:
1. involve systems, structures, and components that are within the scope of license renewal, as delineated in 10 CFR 54.4(a)
  2. consider the effects of aging
  3. involve time-limited assumptions defined by the current operating term (40 years)
  4. are determined to be relevant by the applicant in making a safety determination
  5. involve conclusions, or provide the basis for conclusions, related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b)
  6. are contained or incorporated by reference in the CLB
- D. The project team will ascertain that the PNPS satisfactorily demonstrates that (1) the analyses remain valid for the period of extended operation, (2) the analyses have been (or have been identified and will be [§54.29(a)]) projected to the end of the period of extended operation or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.

- E. Review any industry and plant-specific operating experience associated with the TLAA. This is an area of review emphasis. The project team members should consider the following industry guidance on environmental qualification of electric equipment (from NEI 95-10, Table 6.2-2) as follows:
1. Disposition chosen for each of the identified TLAAs. Also, provide a reference to the summary description of TLAA evaluations in the FSAR supplement (Appendix A). Use hypertext to link to the appropriate location in the appendix for electronic submittals [§54.21(c)(1) and §54.21(d)1].
- F. If it is necessary to ask the applicant a question to clarify the basis for their analyses, follow the logic process shown in Figure 5 of this audit and review plan.
- G. If it is necessary for the applicant to submit additional information to support the basis for the conclusions in their TLAA, the applicant may agree to voluntarily submit the required information as a supplement (docketed letter submitted under oath and affirmation) to the PNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using the worksheet provided in Appendix I, "TLAA Audit/Review Worksheet."

#### 6.4.4 Other Plant-Specific TLAAs

Figure 5, "Evaluation of TLAAs and Exemptions," taken from NEI 95-10, Revision 6, shows the process of evaluating and reviewing TLAAs and also identifying the exemptions in effect. This process flowchart shows the activities and decisions used to audit/review each TLAA that the applicant identifies.

#### Pre-Review Preparation

- A. The project team will determine if the TLAAs identified in the PNPS LRA to be within the NUREG-1800 TLAA category of "other plant-specific TLAAs" have provided adequate information to meet the requirements of 10 CFR 54.21(c)(1) and 10 CFR 54.21(c)(2).
- B. Identify and locate the documents needed to perform the review. These may include, but are not limited to, the following:
1. Excel database on TLAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAs
  2. GALL Report
  3. SRP-LR



4. ISG-LR
  5. RAIs, audit and review reports, and SERs for similar plants
  6. LRA
  7. References listed by applicant for each TLAA
  8. NEI 95-10, Section 5.1 and Table 6.2-2
  9. basis documents
  10. implementation documents
  11. operating experience reports (plant-specific and industry)
  12. lessons learned developed by RLRC
  13. applicant's UFSAR
- C. In addition, the project team will also review the PNPS TLAA's within the NUREG-1800 TLAA category of "other plant-specific TLAA's" to determine if there are emerging issues that should be further evaluated by technical specialists in the NRC Divisions of Component Integrity (DCI) or the Division of Engineering (DE). This is not expected to be an issue for TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(i) "the analyses remain valid for the period of extended operation." or 10 CFR 54.21(c)(iii) "the effects of aging on the intended function(s) will be adequately managed for the period of extended operation." For TLAA's for which the applicant claims consistency with 10 CFR 54.21(c)(ii) - "the analyses have been projected to the end of the period of extended operation," the audit team leader will be consulted to determine which TLAA's the audit team will be capable of reviewing. Consideration should be given to team expertise, past precedent, and complexity of the provided analysis.

#### Audit/Review

- A. Confirm that each PNPS TLAA listed in this section is appropriate. Refer to any analyses and evaluations created during the acceptance review process.
- B. If a TLAA is listed in the SRP-LR or NEI 95-10 and not in its LRA, the PNPS should state in this section that it does not apply.
- C. The project team will conduct both regulatory evaluations and technical evaluations to determine, as defined in 10 CFR 54.3, that each TLAA meets the following six criteria:
  1. involve systems, structures, and components that are within the scope of license renewal, as delineated in 10 CFR 54.4(a)

2. consider the effects of aging
  3. involve time-limited assumptions defined by the current operating term (40 years)
  4. are determined to be relevant by the applicant in making a safety determination
  5. involve conclusions, or provide the basis for conclusions, related to the capability of the system, structure, and component to perform its intended functions, as delineated in 10 CFR 54.4(b)
  6. are contained or incorporated by reference in the CLB
- D. The project team will ascertain that the PNPS satisfactorily demonstrates that (1) the analyses remain valid for the period of extended operation, (2) the analyses have been (or have been identified and will be [§54.29(a)]) projected to the end of the period of extended operation or (3) the effects of aging on the intended function(s) will be adequately managed for the period of extended operation.
- E. Review any industry and plant-specific operating experience associated with the TLAA. This is an area of review emphasis. The project team members should consider the following industry guidance on "other plant-specific TLAA's" (from NEI 95-10, Table 6.2-2) as follows:
1. Identify and evaluate any plant-specific TLAA's.
- F. If it is necessary to ask the applicant a question to clarify the basis for their analyses, follow the logic process shown in Figure 5 of this audit and review plan.
- G. If it is necessary for the applicant to submit additional information to support the basis for the conclusions in their TLAA, the applicant may agree to voluntarily submit the required information as a supplement (docketed letter submitted under oath and affirmation) to the PNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using the worksheet provided in Appendix I, "TLAA Audit/Review Worksheet."

#### **6.5 Audit and Safety Review Documentation**

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

### 6.5.1 Audit and Review 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:

- A. Cover page
- B. Table of Contents
- C. Section 1 Introduction and General Information
  - 1. Section 1.1 Introduction
  - 2. Section 1.2 Background
  - 3. Section 1.3 Summary of Information in the License Renewal Application
  - 4. Section 1.4 Audit Scope
  - 5. Section 1.5 Audit Process
  - 6. Section 1.6 Exit Meeting
- D. Section 2 Aging Management Programs (AMP)
- E. Section 3 Aging Management Review (AMR) Results
- F. Attachment 1 Abbreviations and Acronyms
- G. Attachment 2 Project Team and Applicant Personnel
- H. Attachment 3 Elements of an Aging Management Program for License Renewal
- I. Attachment 4 Disposition of Requests for Additional Information, LRA Supplements, and Open Items
- J. Attachment 5 List of Documents Reviewed
- K. Attachment 6 List of Commitments

### 6.5.2 Safety Evaluation Report Input

- A. General guidance
  - 1. 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 shall collect, assemble, and prepare the complete SER input.
  - 2. In general, the data and information needed to prepare the SER input should be available in the project team's audit and review report and the team member's worksheets.

3. SER inputs are to be prepared for:
  - a. Each AMP that was determined to be consistent with the GALL Report, which has no exceptions or enhancements.
  - b. Each AMP that was determined to be consistent with the GALL Report, which has exceptions (identified by either the applicant or the project team) or enhancements.
  - c. Each plant-specific AMP.
  - d. AMRs that are consistent with the GALL Report.
  - e. Project team AMR review results.<sup>4</sup>
4. The SER input should contain the following sections. (Note: The following section numbers (3. through 3.X.3) are based on the numbering system for the SER input. They are not a continuation of the numbering convention used throughout this plan.)
  3. Aging Management Review Results
  - 3.0 Applicant's Use of the Generic Aging Lessons Learned Report
    - 3.01 Format of the LRA
    - 3.02 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
      - 3.0.3.3 AMPs that are Plant-Specific
    - 3.0.4 Quality Assurance Program Attributes Integral to Aging Management Programs
    - 3.X<sup>5</sup> Aging Management of \_\_\_\_\_
    - 3.X.1 Summary of Technical Information in the Application
    - 3.X.2 Staff Evaluation

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<sup>4</sup> AMRs that are not consistent with the GALL Report.

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

- 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
5. For each AMP audited/reviewed by the project team, the SER shall include a discussion of the team's review of the operating experience program element.
  6. If the applicant submitted an amendment or a supplement to its LRA that is associated with the project team's audit or review activities, document the submittal (include the date and ADAMS accession number) and explain the issue that the submittal resolved and discuss the basis for the resolution.
  7. If an RAI was issued, identify the RAI number and briefly discuss the RAI. State if the RAI remains open or if the applicant response has been received and accepted. If the response was acceptable, identify the submittal (including the date and the ADAMS accession number) that provided the response and document the basis for its acceptance.
  8. Issues (e.g., RAIs) that have not been resolved by the applicant at the time the SER input is prepared should be identified as open items.
- B. SER input
1. 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 update (Appendix A of the LRA) is acceptable. This SER input documents that the AMP is consistent with the GALL Report.
  2. 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 period of extended 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.
  3. For plant-specific AMPs, the SER input should document the basis for accepting each of the seven elements reviewed by the project team. The SER input should also include a discussion concerning the adequacy of the UFSAR supplement.

4. For aging management evaluations that are consistent with the GALL Report,<sup>6</sup> the SER input should include the following:
  - a. Identify the LRA section reviewed.
  - b. A summary of the type of information provided in the section of the LRA reviewed, including a listing of the AMPs reviewed.
  - c. Identify the LRA Tables 3.X.2-Y reviewed.
  - d. A summary review of the AMR Notes A through E used to classify the AMR line items used in these tables.
  - e. 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.
  - f. The bases for accepting any exceptions to GALL AMRs that were identified by the applicant or the project team member.
  - g. A finding that verifies that:
    - the applicant identified the applicable aging effects
    - the applicant defined the appropriate combination of materials and environments
    - the applicant specified acceptable AMPs
  - h. 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 period of extended operation, and that 10 CFR 54.21(a)(3) has been satisfied.
5. For aging management evaluations that are consistent with the GALL Report, for which further evaluation is recommended, the SER input should include the following:
  - a. The LRA section containing the applicant's further evaluations of AMRs for which further evaluation is required.
  - b. A list of the aging effects for which the further evaluation apply.

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<sup>6</sup> The audit results documented in this section address the AMRs consistent with the GALL Report for which no further evaluation is recommended.

- c. For the applicant's further evaluations, provide a summary of the basis for concluding that it satisfied the criteria of Section 3.1.3.2 of the SRP-LR.
  - d. A statement that the staff audited the applicant's further evaluations against the criteria contained in Section 3.1.3.2 of the SRP-LR.
  - e. A statement that the audit and review report contains additional information. Also identify the issue date and the ADAMS accession number for the audit and review report.
6. Staff AMR Review Results.<sup>7</sup> This section of the SER input documents the reviews of AMRs assigned to the project team that are not consistent with the GALL Report. The audit report should document the following, based on a precedent identified by the applicant:
- a. The LRA section reviewed.
  - b. A summary of the type of information provided in the section of the LRA, reviewed, including a listing of the AMPs reviewed for this LRA section.
  - c. Identify the LRA Tables 3.X.2-Y documented by this audit writeup.
  - d. A brief summary of what the staff (project team) reviewed (i.e., LRA and applicant basis documents and other implementation documents).
  - e. A finding that verifies, if true, that:
    - The applicant identified the applicable aging effects.
    - The applicant listed the appropriate combination of materials and environments.
    - The applicant specified acceptable AMPs.
  - f. Provide 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 period of extended operation, and that 10 CFR 54.21(a)(3) has been satisfied.

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<sup>7</sup> This section documents reviews of AMRs assigned to the project team that are not consistent with the GALL Report.

### **6.6 Documents Reviewed and Document Retention**

Any documents reviewed that were used to formulate the basis for resolution of an issue, such as the basis for a technical resolution, the basis for the acceptance of an exception or an enhancement, etc., should be documented as a reference in the audit and review report.

Upon issuance of the audit and review report, all worksheets that were completed by contractor and NRC personnel shall be given to the NRC project team leader.

After the NRC has made its licensing decision, all copies of documents collected and all documents generated to complete the audit and review report, such as audit worksheets, question and answer tracking documentation, etc., are to be discarded.



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**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 mitigative 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 period of extended 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 period of extended operation.

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**Table 2. Notes for License Renewal Application Tables 3.X.2-Y<sup>6</sup>**

<b>Note</b>	<b>Description</b>
A	Consistent with NUREG-1801 [GALL Report] item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801AMP.
C	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP is consistent with NUREG-1801AMP.
D	Component is different, but consistent with NUREG-1801 item for material, environment, and aging effect. AMP takes some exceptions to NUREG-1801AMP.
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.

<sup>6</sup> Each AMR line item is coded with a letter which represents a standard note designation 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 in the format of the standardized format for license renewal applications by letter dated April 7, 2003, from P.T. Kuo, NRC, to A. Nelson, NEI (ML030990052).

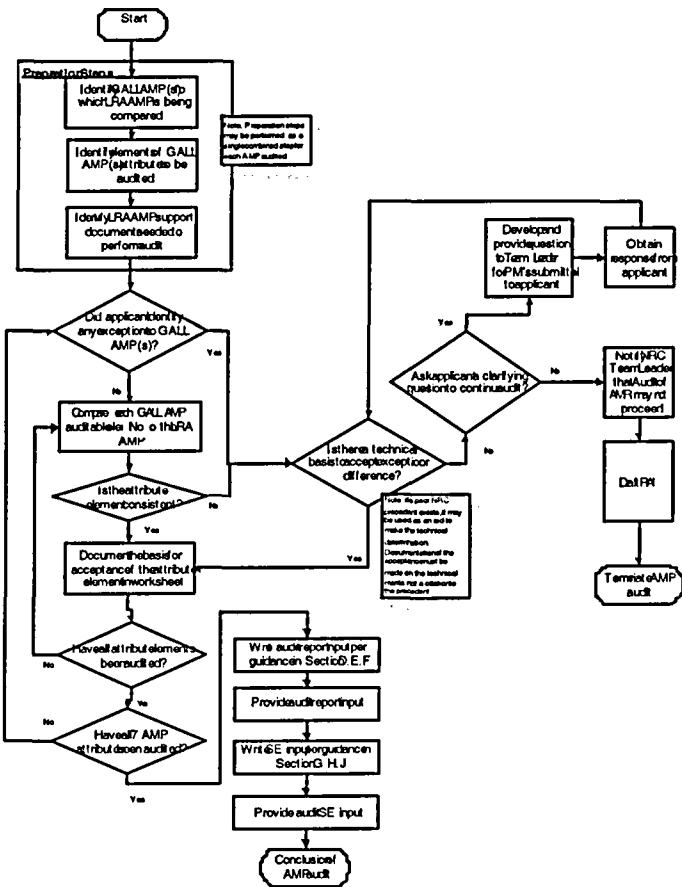


Figure 1. Audit of AMPs that are Consistent with the GALL Report

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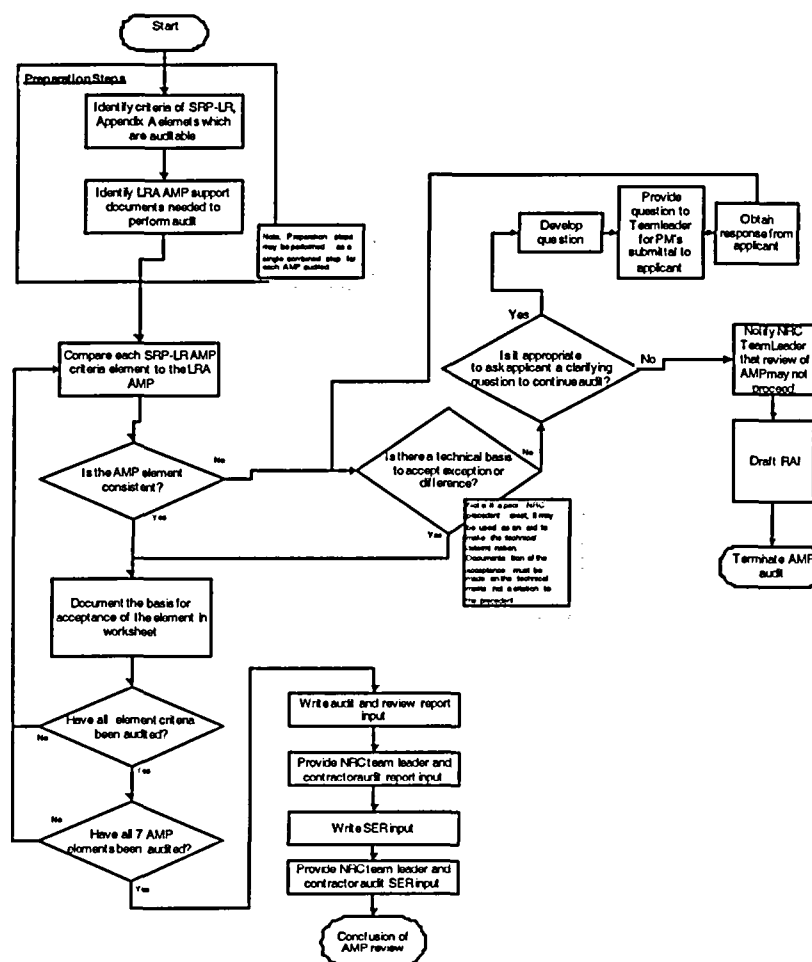


Figure 2. Audit of Plant-Specific AMPs

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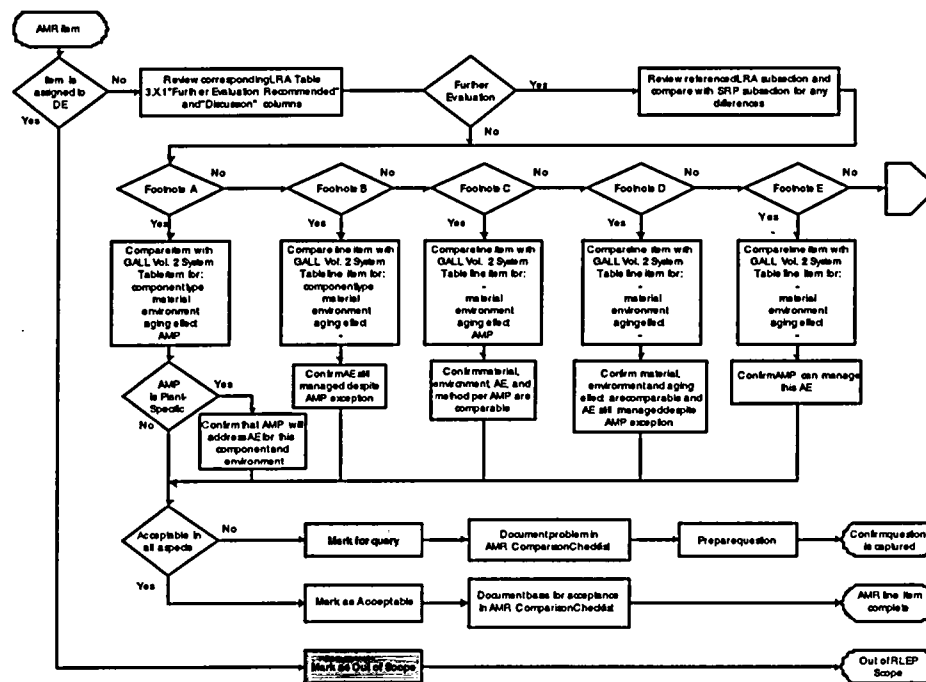


Figure 3. Review of AMRs that are Consistent with the GALL Report

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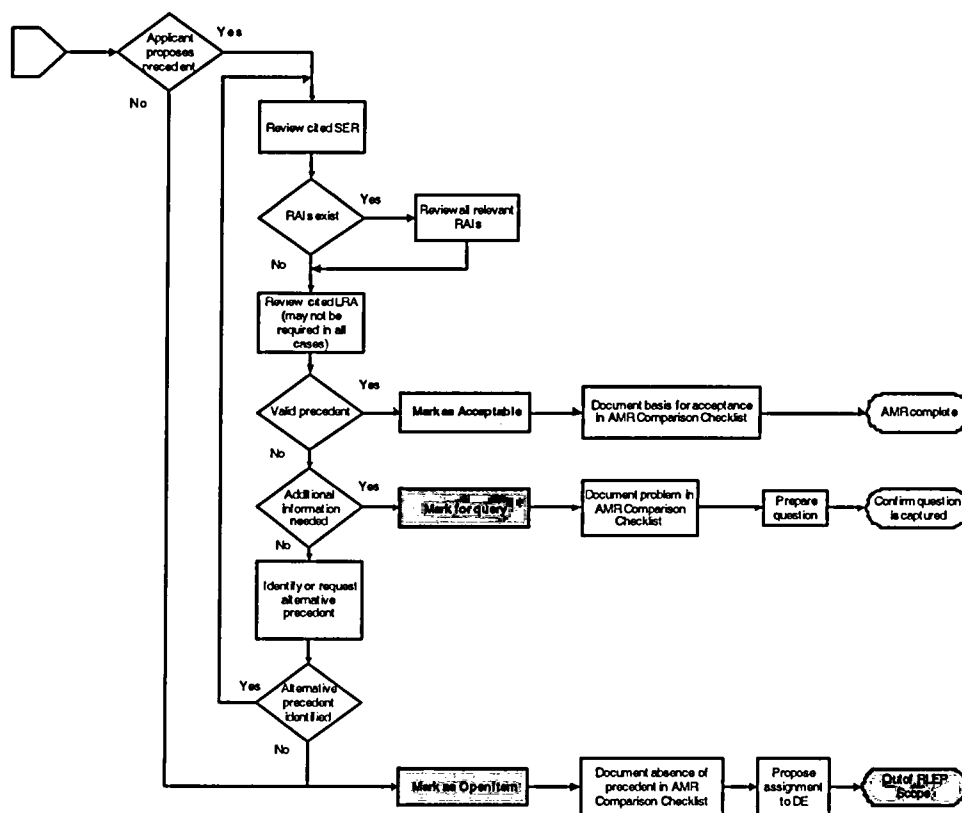


Figure 4. Review of AMRs Using NRC-Approved Precedents

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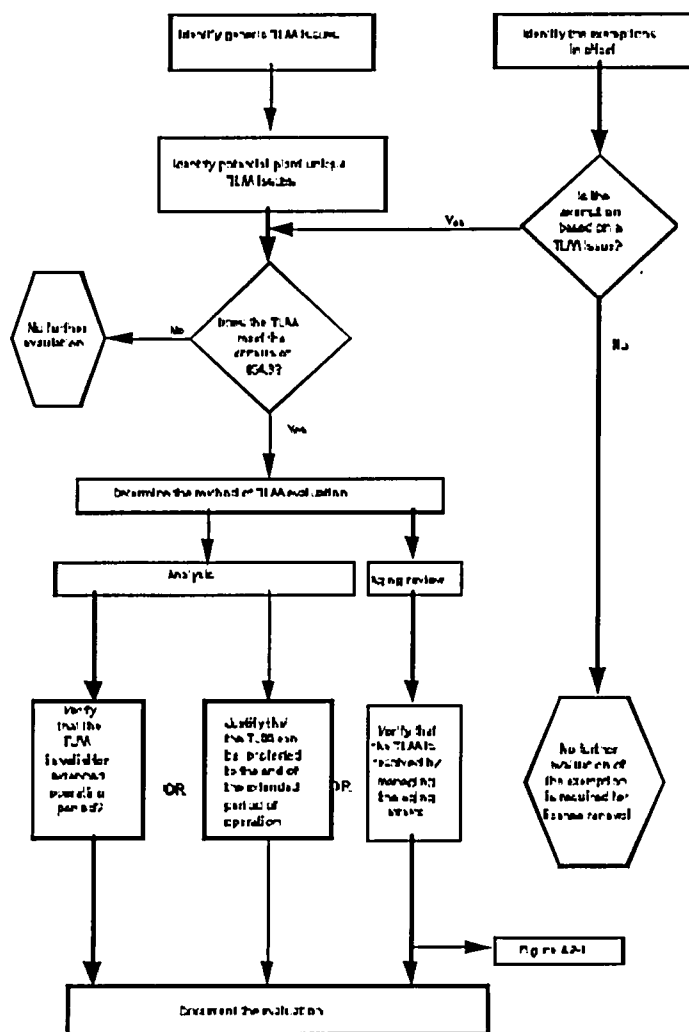


Figure 5. Review of TLAAs and Exemptions (from NEI 95-10, Revision 6)

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**APPENDIX A****PROJECT TEAM MEMBERSHIP**

<b>Organization</b>	<b>Name</b>	<b>Function</b>
NRC/NRR/DLR/RBC	James Davis	Team leader
NRC/NRR/DIR/RLRC	Peter Wen	Back-up Team Leader
NRC/NRR/DIR/RLRC	Dan Hoang	Reviewer - Structures
NRC/NRR/DLR/RLRC	Duc Nguyen	Reviewer - Electrical
ATL International	Erach Patel	Contractor lead, Reviewer - Mechanical
ATL International	Bob Johnson	Reviewer - Systems
ATL International	Wayne Pavinich	Reviewer - Materials



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## APPENDIX B

## RLRC SCHEDULE FOR PILGRIM LRA SAFETY REVIEW

<b>Team Leader</b>	James Davis	<b>Contractor</b>	ATL International Inc.
<b>Backup Team Leader</b>	Peter Wen	<b>ATL Audit Team Leader</b>	Erach Patel
<b>Project Manager</b>	Kathy Weaver	<b>ATL Project Manager</b>	Mark Orr
<b>TAC Number</b>	MC 9669	<b>ATL Project Number</b>	0229

	Activity/Milestone	Anticipated Date
1	Received license renewal application (LRA)	01/27/06*
2	Make review assignments (Project Manager)	03/28/06*
3	Train project team (Team Introduction Meeting)	03/20/06*
4a	Hold team planning and kick-off meeting	03/20/06*
4b	Finalize split table and issue assignments to audit team	03/24/06
5	Issue audit plan to Project Manager ( 5 days after assignments)	04/05/06
6	First site visit	05/22/06 to 05/26/06
7a	Draft AMP audit report information from audit report team to audit team leader - in sections as completed - completed by	06/09/06
7b	Draft AMP audit report from ATL to NRC	06/20/06
8	Draft Safety Evaluation Report (SER) input for AMP reviews	Not Applicable
9	Conduct in-office reviews of Aging Management Reviews	03/20/06 to 06/16/06
10	Conduct second site visit (resolve AMR and AMP questions)	06/19/06 to 06/23/06
11a	Draft AMR audit report notes from team to Audit Team Leader	07/14/06
11b	Draft AMR audit report from Audit Team Leader to ATL	07/22/06
11c	Draft final AMR audit report from ATL to NRC	08/04/06
11d	NRC comments on draft final AMR audit report to ATL	08/18/06
12	Draft SER input for AMR reviews (team members)	Not Applicable
13	Conduct third site visit to resolve outstanding issues and questions (if needed)	07/24/06 to 07/27/06
14	Conduct public exit meeting	07/27/06
15	Writing session for audit and review report and SER input	Not Applicable
16	Provide requests for additional information (RAIs) to Project Manager	08/04/06

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## APPENDIX C

## AGING MANAGEMENT PROGRAM ASSIGNMENTS

PNPS LRA AMP Number	GALL Report AMP Number	Aging Management Program	Consistent With GALL?		Assigned Auditor
B.1.1	XI.M.22	Boraflex Monitoring	Yes		Peter Wen
B.1.2	XI.M.34	Buried Piping and Tanks Inspection	Yes	Exception	Jim Davis
B.1.3	XI.M.6	BWR Control Rod Drive Return Line Nozzle	Yes	Exception	Jim Davis
B.1.4	XI.M.5	BWR Feedwater Nozzle	Yes	Exception	Jim Davis
B.1.5	XI.M.8	BWR Penetrations	Yes	Exception	Bob Jackson
B.1.6	XI.M.7	BWR Stress Corrosion Cracking	Yes	Exception - Enhanced	Bob Jackson
B.1.7	XI.M.4	BWR Vessel ID Attachment Welds	Yes	Exception	Bob Jackson
B.1.8	XI.M.9	BWR Vessel Internals	Yes	Exception - Enhanced	Bob Jackson
B.1.9	XI.S.4	Containment Leak Rate	Yes		Dan Hoang
B.1.10	XI.M.30	Diesel Fuel Monitoring	Yes	Exception - Enhanced	Wayne Pavinich
B.1.11	X.E.1	Environmental Qualification of Electric Components	Yes		Duc Nguyen
B.1.12	X.M.1	Fatigue Monitoring	Yes	Exception	Erach Patel
B.1.13.1	XI.M.26	Fire Protection	Yes	Exception - Enhanced	Erach Patel
B.1.13.2	XI.M.27	Fire Water System	Yes	Exception - Enhanced	Erach Patel
B.1.14	XI.M.17	Flow-Accelerated Corrosion	Yes		Peter Wen
B.1.15	N/A	Heat Exchanger Monitoring			Wayne Pavinich

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PNPS LRA AMP Number	GALL Report AMP Number	Aging Management Program	Consistent With GALL?		Assigned Auditor
B.1.16.1	N/A	Containment Inservice Inspection			Dan Hoang
B.1.16.2	N/A	Inservice Inspection			Bob Jackson
B.1.17	N/A	Instrument Air Quality			Wayne Pavinich
B.1.18	XI.E.4	Metal-Enclosed Bus Inspection	Yes	Exception	Duc Nguyen
B.1.19	XI.E.3	Non-EQ Inaccessible Medium-Voltage Cable Program	Yes		Duc Nguyen
B.1.20	XI.E.2	Non-EQ Instrumentation Circuits Test Review	Yes		Duc Nguyen
B.1.21	XI.E.1	Non-EQ Insulated Cables and Connections	Yes		Duc Nguyen
B.1.22	XI.M.39	Oil Analysis	Yes	Exception - Enhanced	Wayne Pavinich
B.1.23	XI.M.32	One-Time Inspection	Yes		Erach Patel
B.1.24	N/A	Periodic Surveillance and Preventive Maintenance			Wayne Pavinich
B.1.25	XI.M.3	Reactor Head Closure Studs	Yes	Exception	Bob Jackson
B.1.26	XI.M.31	Reactor Vessel Surveillance	Yes	Enhanced	DE Staff
B.1.27	XI.M.33	Selective Leaching	Yes		Peter Wen
B.1.28	XI.M.20	Service Water Integrity	Yes	Exception	Wayne Pavinich
B.1.29.1	XI.S.5	Masonry Wall	Yes		Dan Hoang
B.1.29.2	XI.S.6	Structures Monitoring	Yes	Enhanced	Dan Hoang
B.1.29.3	XI.S.7	Water Control Structures Monitoring	Yes	Enhanced	Dan Hoang
B.1.30	XI.M.36	System Walkdown	Yes		Peter Wen

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PNPS LRA AMP Number	GALL Report AMP Number	Aging Management Program	Consistent With GALL?		Assigned Auditor
B.1.31	XI.M.13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	Yes		Peter Wen
B.1.32.1	N/A	Water Chemistry Control – Auxiliary Systems			Erach Patel
B.1.32.2	XI.M.2	Water Chemistry Control – BWR	Yes		Erach Patel
B.1.32.3	XI.M.21	Water Chemistry Control – Closed Cooling Water	Yes	Exception	Erach Patel

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**APPENDIX D****AGING MANAGEMENT REVIEW ASSIGNMENTS**

<b>Aging Management Reviews</b>	<b>Reviewer</b>
3.1 Aging Management of Reactor Vessel, Internals, and Reactor Coolant System	Bob Jackson
3.2 Aging Management of Engineered Safety Features	Wayne Pavinich
3.3 Aging Management of Auxiliary Systems	Erach Patel
3.4 Aging Management of Steam and Power Conversion Systems	Peter Wen
3.5 Aging Management of Containment, Structures, and Component Supports	Dan Hoang
3.6 Aging Management of Electrical and Instrumentation and Controls	Duc Nguyen

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## APPENDIX E

## TIME-LIMITED AGING ANALYSIS REVIEW ASSIGNMENTS

LRA TLAA Number	GALL Report TLAA Number	TLAA Title	10 CFR 54.21(c)(1)		Assigned Reviewer
			(I) or (III)	(II)	
4.1		Identification of TLAAs and Exemptions			J. Davis
4.2		Reactor Vessel Neutron Embrittlement	(i)	(ii)	DCI
4.3	X.M.1	Metal Fatigue	(i) or (iii)	(ii)	E. Patel
4.4	X.E.1	Environmental Qualification or Electrical Components	(iii)		D. Nguyen
4.5	X.S.1	Concrete Containment Tendon Prestress	Not Applicable to PNPS		N/A
4.6		Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analysis		(ii)	DE
4.7.2.2		TLAA in BWRVIPs	(i)	(ii)	J. Davis
4.7.2.3		TLAA in BWRVIPs	(i)	(ii)	J. Davis
4.7.2.5		TLAA in BWRVIPs	(i)	(ii)	J. Davis

**APPENDIX F****CONSISTENT WITH GALL REPORT AMP AUDIT/REVIEW WORKSHEET**

The worksheet provided in this appendix provides, as an aid for the reviewer, a process for documenting the basis for the assessment of the elements and sub-elements contained in the GALL Report AMPs (Chapter XI of NUREG-1801, Volume 2). The worksheet provides a systematic method for recording the basis for assessments or to identify when the applicant needs to provide clarification or additional information. Information recorded in the worksheets will also be used to prepare the audit and review report and the safety evaluation report input.

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LRA Appendix Subsection:	LRA AMP Title:
GALL Report Subsection:	Gall Report Title:

**A. Element Review and Audit****Program Description:**

G Consistent with GALL Report    G Difference Identified  
Discussion:

**1. Scope of Program:**

G Consistent with GALL Report    G Exception    G Enhancement    G Difference Identified  
Discussion:

**2. Preventive Action:**

G Consistent with GALL Report    G Exception    G Enhancement    G Difference Identified  
Discussion:

**3. Parameters Monitored/Inspected:**

G Consistent with GALL Report    G Exception    G Enhancement    G Difference Identified  
Discussion:

**4. Detection of Aging Effects:**

G Consistent with GALL Report    G Exception    G Enhancement    G Difference Identified  
Discussion:

**5. Monitoring and Trending:**

G Consistent with GALL Report    G Exception    G Enhancement    G Difference Identified  
Discussion:

**6. Acceptance Criteria:**

G Consistent with GALL Report    G Exception    G Enhancement    G Difference Identified  
Discussion:



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**7. Corrective Action: To be performed by DIPM**

**8. Confirmation Process: To be performed by DIPM**

**9. Administrative Controls: To be performed by DIPM**

**10. Operating Experience:**

**B. FSAR supplement review: (Include any commitments.)**

**C. Remarks and questions:**

**D. References/documents used: (Include number designation, full title, revision number, date, and page numbers, and ADAMS accession number.)**

**E. Applicant contact:**

**Project team member:** \_\_\_\_\_ **Date:** \_\_\_\_\_

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## **Appendix G**

### **Plant-Specific AMP Audit/Review Worksheet**

**APPENDIX G****PLANT-SPECIFIC AMP AUDIT/REVIEW WORKSHEET**

The worksheet provided in this appendix provides, as an aid for the reviewer, a process for documenting the basis for the assessments concerning individual 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 or identifying when the applicant needs to provide additional information. Information recorded in these worksheets will be used when preparing the audit and review report and the safety evaluation report input.

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**Plant-Specific AMP Audit/Review Worksheet**

AMP Title: \_\_\_\_\_

Appendix Subsection: \_\_\_\_\_

**A. Element Review and Audit****1. Scope of Program:**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

**2. Preventive Action:**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

**3. Parameters Monitored/Inspected:**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

**4. Detection of Aging Effects**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

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**5. Monitoring and Trending**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

**6. Acceptance Criteria**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

7. **Corrective Action:** To be performed by DIPM8. **Confirmation Process:** To be performed by DIPM9. **Administrative Controls:** To be performed by DIPM**10. Operating Experience:**

\_\_\_ Consistent with SRP-LR    \_\_\_ Exception    \_\_\_ Difference Identified

Discussion:

SRP Criteria	LRA AMP	Comment*

\* Consistent or technical basis for acceptance exception or difference

**B. FSAR supplement review:** (Include any commitments.)**C. Remarks and questions:****D. References/Documents used:** (Include number designation, full title, revision number, date, page numbers, and ADAMS accession number.)**E. Applicant Contact:**

Project team member: \_\_\_\_\_ Date: \_\_\_\_\_

## **Appendix H**

### **AMR Comparison Worksheets**

H-1

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

The audit team verified that items in Table 3.X.1 (Table 1) correspond to items in the GALL Volume 1, Table X. All items applicable to BWRs in Table 1 were reviewed and are addressed in the following table.

Item No.	Further Evaluation Recommended	Discussion

Audit Remarks (Document all questions for applicant here):

Number	Question for applicant (draft per RAI guidance)	Response (with date)

References/Documents Used:

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

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<b>PNPS AMR MEAP Comparison (Table 2) Worksheet</b>			<b>Audit Date:</b>
<b>Unit:</b>	<b>Table No.:</b>	<b>Chapter:</b>	
<b>Auditor Name(s):</b>			

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 Insert)

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

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

**References/Documents Used:**

- 5.
- 6.
- 7.



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**APPENDIX I (LATER)**

**TIME-LIMITED AGING ANALYSIS (TLAA) AUDIT/REVIEW WORKSHEET**

**APPENDIX J****ACRONYMS, ABBREVIATIONS, AND INITIALISMS**

ADAMS	Agencywide Documents Access and Management System
AMP	aging management program
AMR	aging management review
ASME	American Society of Mechanical Engineers
CLB	current licensing basis
DE	Division of Engineering
DPM	Division of Inspection Program Management
FSAR	final safety analysis report
GALL	Generic Aging Lessons Learned
ISG	interim staff guidance
LRA	license renewal application
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PNPS	Pilgrim Nuclear Power Station
RAI	request for additional information
RLEP-B	License Renewal and Environmental Impacts Program, Section B
RLSB	License Renewal and Standardization Branch
SC	structures and components
SER	safety evaluation report

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SRP-LR     Standard Review Plan - License Renewal  
SSC        structure, system, and component  
  
UFSAR     updated final safety analysis report