

Audit and Review Plan for  
Plant Aging Management Programs  
and Reviews

Vermont Yankee Nuclear Power Station  
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Revision 0

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# **Audit and Review Plan for Plant Aging Management Programs and Reviews Vermont Yankee Nuclear Power Stations**

## **1. Introduction**

By letter dated January 27, 2006 (Agencywide Documents Access and Management System [ADAMS] Accession Number ML060300082), Entergy Nuclear Vermont Yankee, LLC (Entergy VY), the applicant, submitted to the U.S. Nuclear Regulatory Commission (NRC) its application for renewal of Operating License DPR-28 for Vermont Yankee Nuclear Power Station (VYNPS) (ML060300085). The applicant requested renewal of its 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 VYNPS, the Division of License Renewal (DLR), License Renewal Branch C (RLRC), will lead a project team that will audit and review aging management reviews (AMRs), aging management programs (AMPs), and time-limited aging analyses (TLAAs) developed by the applicant to support its LRA for VYNPS. The project team will include NRC staff and contractor personnel provided by Information Systems Laboratories, Inc. (ISL), RLRC's technical contractor. Appendix A, "Project Team Members," lists the project team members. This document is the RLRC plan for auditing and reviewing of assigned aging management reviews, aging management programs, and time-limited aging analysis for VYNPS.

The project team will audit and review its assigned AMRs, AMPs and TLAAAs 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 Revision 1 of NUREG-1800, "Standard Review Plan for Review of License Renewal Application for Nuclear Power Plants" (SRP-LR); the guidance provided in Revision 1 of NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," and this audit and review plan. In the following sections of this document, references to NUREG-1800 and NUREG-1801 will be to the Revision 1 versions of these documents. For the scope of work defined in this audit and review plan, the project team will determine 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 VYNPS current licensing basis (CLB) for the period of extended operation.

The project team will perform its work at NRC Headquarters, Rockville, Maryland; at ISL's offices in Rockville, Maryland; and at the VYNPS site near Brattleboro, Vermont. The project team will perform its work in accordance with the schedule shown in Appendix B, "RLRC Schedule for LRA Safety Review." The project team will conduct a public exit meeting at the applicant's offices in Brattleboro, Vermont, after it completes its on-site work.

This plan includes the following information:

- C     **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.

- C **Objectives.** The objectives of the audits and reviews addressed by this audit and review plan.
- C **Summary of Information Provided in License Renewal Application.** Description of the information contained in the license renewal application for VYNPS that is applicable to this plan.
- C **Overview of the Audit, Review, and Documentation Procedure.** Summary of the process that the project team will follow to conduct its audit and review of the VYNPS LRA.
- C **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 VYNPS LRA information that is within its scope of review, and to document the results of its work.
- C **Appendices.** Supporting information. The project team members are shown in Appendix A and the schedule is shown in Appendix B. The project team's work assignments are shown in Appendices C, D and E. Appendices F, G and H are the worksheets that the individual project team members use to document the results of their audit and review audit work. The application of these worksheets is discussed in Section 6 of this audit and review plan. Appendix I is a list of the abbreviations and acronyms used in this audit and review plan.

## 2. Background

In 10 CFR 54.4, the scope of license renewal is defined as those systems, structures 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.

License renewal also requires the identification and updating of the TLAAAs. During the design phase for a plant, certain assumptions are made about the length of time the plant can operate. These assumptions are incorporated into design calculations for several of the plant's SSCs. In accordance with 10 CFR 54.21(c)(1)(i), (ii), and (iii), the applicant must either (i) show that these calculations will remain valid for the period of extended operation, (ii) project the analyses to the end of the period of extended operation, or (iii) demonstrate that the effects of aging on these SSCs can be adequately managed for the period of extended operation.

In addition, 10 CFR 54.21(d) requires that the applicant submit a supplement (docketed letter submitted under oath and affirmation) 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 and the evaluation of time-limited aging analyses for 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 credited for managing aging of most of the SCs used by 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 period of extended operation. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used 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) SSCs, (2) component materials, (3) environments to which the components are exposed, (4) the aging effects/aging mechanisms associated with the materials and environments, (5) AMPs that are credited with managing 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 NRC-approved topical report that is generically applicable. An applicant may reference the GALL Report in its LRA to demonstrate that its programs correspond to those that the staff reviewed and approved in the GALL Report. If the material presented in the LRA is consistent with the GALL Report and is applicable to the applicant's facility, the staff will accept the applicant's reference to the GALL Report. In making this determination, the staff considers whether the applicant has identified specific programs described and evaluated in the GALL Report but does not conduct a re-review of the substance of the matters described in the GALL Report. Rather, the staff determines that the applicant established that the approvals set forth in the GALL Report apply to its programs.

If an applicant takes credit for a GALL Report program, it is incumbent on the applicant to ensure that its plant program addresses all ten program elements of the referenced GALL Report program. These elements are described in the SRP-LR, Appendix A.1, "Aging Management Review - Generic (Branch Technical Position RLSB-1)." In addition, the conditions at the plant must be bounded by the conditions for which the GALL Report program was evaluated. The applicant must certify in its LRA that it completed the appropriate verifications and that those verifications are documented and retained by the applicant in an auditable form.

The SRP-LR also provides staff guidance for reviewing time-limited aging analyses. Pursuant to 10 CFR 54.21(c)(1), a license renewal application is required to provide a list of TLAAs, 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 TLAAs. The number and type of TLAAs 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 TLA. Pursuant to 10 CFR 54.3, TLAs 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 licensee 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 TLAAAs remain valid for the period of extended operation; the TLAAAs 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 TLAAAs. The staff also confirms that the applicant did not omit any TLAAAs, as defined in 10 CFR 54.3.

### **3. Objectives**

The overall objective of the audit and review described in this audit and review plan is to determine compliance with 10 CFR 54.21(a)(3) and 10 CFR 54.21(c)(1). 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 VYNPS is described in Sections 5 and 6 of this audit and review plan. It is intended to accomplish the following objectives:

- C For VYNPS AMPs that the applicant claims are consistent with GALL Report AMPs, determine that the plant AMPs contain the program elements of the referenced GALL Report AMP and that the conditions at the plant are bounded by the conditions for which the GALL Report AMPs were evaluated.
- C For VYNPS AMPs that the applicant claims are consistent with GALL Report AMPs with exceptions, determine that the plant AMPs contain the program elements of the referenced GALL Report AMPs and that the conditions at the plant are bounded by the conditions for which the GALL Report AMPs were evaluated. In addition, determine and evaluate that the applicant has documented an acceptable technical basis for each exception.



- C For VYNPS AMPs that the applicant claims will be consistent with GALL Report AMPs after specified enhancements are implemented, determine that the plant AMPs, with the enhancements, will be consistent with the referenced GALL Report AMPs. In addition, determine that the applicant identified the enhancements as commitments in the Updated Final Safety Analysis Report (UFSAR) or other docketed correspondence.
- C For plant-specific VYNPS AMPs determine that these AMPs are acceptable on the basis of a technical review.
- C 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.
- C 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.
- C 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.
- C 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.
- C For TLAAs, determine that the applicant has properly identified the TLAAs. TLAAs are certain plant-specific safety analyses that are based on an explicitly assumed 40-year plant life (for example, aspects of the reactor vessel design). Pursuant to 10 CFR 54.21(c)(1), a license renewal applicant is required to provide a list of TLAAs, as defined in 10 CFR 54.3. The area relating to the identification of TLAAs is reviewed. TLAAs 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 TLAAs, is not an area within the scope of the license renewal review. Any question regarding the adequacy of the CLB must be addressed under the backfit rule (10 CFR 50.109) and is separate from the license renewal process.
- C Determine that the applicant has demonstrated that (1) the TLAAs remain valid for the period of extended operation; (2) the TLAAs 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 VYNPS LRA closely follows the standard LRA format presented in Revision 6 of Nuclear Energy Institute (NEI) 95-10, "Industry Guidelines for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule." Section 3 of the VYNPS LRA provides the results of the aging management review for structures and components that the applicant identified as being subject to aging management review. Section 4 VYNPS LRA addressed time-limited aging analyses.

VYNPS LRA Table 3.0-1, Table 3.0-2, and Table 3.0-3 provide descriptions of the subject(s) for these table(s) – environments used in the AMRs to determine the aging effects requiring management. Results of the AMRs are presented in two different types of tables. The applicant refers to the two types of tables as Table 1 and Table 2.

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

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

VYNPS LRA Tables 3.1.1 through 3.6.1 (Table 1 types) provide a summary comparison of how the VYNPS AMR results align with Tables 1 through 6 of the GALL Report, Volume 1. These VYNPS LRA tables are essentially the same as Tables 1 through 6 of the GALL Report,

Volume 1, except that the “Type” column has been replaced by an “Item Number” column, the GALL Volume 2 Item Number column has been deleted, and a “Discussion” column has been added. The “Item Number” column provides a means to cross-reference between VYNPS LRA Table 3.X.2-Y (Table 2 type) and VYNPS LRA Table 3.X.1 (Table 1 type). The “Discussion” column includes further information. The following are examples of information that might be contained within the “Discussion” column:

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

VYNPS LRA Table 2 types provide the detailed results of the AMRs for those SCs that are subject to an aging management review. There is a Table 2 for each subgroup within the six system/component groups. For example, the engineered safety features 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 of the VYNPS LRA consists of the following nine columns.

- C *Component Type.* Column 1 identifies the component types that are subject to an AMR. The component types are listed in alphabetical order. In the structural tables, component types are sub-grouped by material.
- C *Intended Function.* Column 2 identifies the license renewal intended functions for the listed component types. Definitions and abbreviations of intended functions are listed in Table 2.0-1 in Section 2 of the VYNPS LRA.
- C *Material.* Column 3 lists the particular materials of construction for the component type being evaluated.
- C *Environment.* Column 4 lists the environment to which the component types are exposed. Internal and external service environments are indicated. A description of these environments is provided in VYNPS LRA Table 3.0-1, Table 3.0-2, and Table 3.0-3 for mechanical, structural, and electrical components, respectively.
- C *Aging Effect Requiring Management.* Column 5 lists the aging effects identified as requiring management for the material and environment combinations of each component type.
- C *Aging Management Programs.* Column 6 lists the programs used to manage the aging effects requiring management.

- C *GALL Report (Vol. 2) Item.* Each combination of the following factors listed in LRA Table 2 is compared to the GALL Report to identify consistencies: component type, material, environment, aging effect requiring management, and aging management program. Column 7 documents identified consistencies by noting the appropriate GALL Report item number. If there is no corresponding item number in the GALL Report for a particular combination of factors, column 7 is left blank.
- C *LRA Table 1 Item.* Each combination of the following that has an identified GALL Report item number also has a Table 1 line item reference number: component type, material, environment, aging effect requiring management, and aging management program. Column 8 lists the corresponding line item from Table 1. If there is no corresponding item in the GALL Report (Volume 1), column 8 is left blank.
- C *Notes.* Column 9 contains notes that are used to describe the degree of consistency with the line items in the GALL Report.

## 4.2 Time-Limited Aging Analyses

The VYNPS 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 VYNPS LRA addresses time-limited aging analyses. In Section 4.1.1, the VYNPS 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:

- C Technical Specifications
- C UFSAR
- C docketed licensing correspondence
- C fire protection program documents
- C NRC safety evaluation reports
- C BWRVIP documents

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

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

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

Following the section identifying the TLAA's, the VYNPS LRA next includes a section identifying any exemptions. 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 VYNPS performed this by reviewing VYNPS docketed correspondence which identified VYNPS exemptions. The results of this review determined that no VYNPS exemptions depend on time-limited aging analyses.

The VYNPS 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.

<b>TLAA Description</b>	<b>Resolution Option</b>	<b>Section</b>
<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

<b>TLAA Description</b>	<b>Resolution Option</b>	<b>Section</b>
Environmental Qualification Analyses for Electrical Components	Aging effect managed 10 CFR 54.21(c)(1)(iii)	4.4
<b>Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses</b>		4.6
Fatigue of the torus	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.6.1
Fatigue of safety relief valve (SRV) discharge piping	Analysis remains valid 10 CFR 54.21(c)(1)(i) AND Analysis projected 10 CFR 54.21(c)(1)(ii)	4.6.2
Fatigue of other torus-attached piping	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.6.3
<b>Other TLAA</b>		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	Updated by BWRVIP-74. See BWRVIP-74 entry.	4.7.2.1
BWRVIP-25, core plate rim holddown bolts loss of preload analysis	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.7.2.2
BWRVIP-38, shroud support fatigue analysis	Analysis remains valid 10 CFR 54.21(c)(1)(i)	4.7.2.3
BWRVIP-47, lower plenum fatigue analysis	Analysis remains valid 10 CFR 54.21(c)(1)(i)	4.7.2.4
BWRVIP-48, vessel ID attachment welds fatigue analysis	Analysis remains valid 10 CFR 54.21(c)(1)(i)	4.7.2.5
BWRVIP-49, instrument penetrations fatigue analysis	Analysis projected 10 CFR 54.21(c)(1)(ii)	4.7.2.6
BWRVIP-74, reactor vessel P/T curves analysis Fatigue analysis CVUSE 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	4.7.2.7

<b>TCAA Description</b>	<b>Resolution Option</b>	<b>Section</b>
BWRVIP-76, core shroud	Analysis remains valid 10 CFR 54.21(c)(1)(i)	4.7.2.8

## **5. Overview of Audit, Review, and Documentation Procedure**

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

### **5.1 Aging Management Programs**

Table 1 of this audit and review plan summarizes the ten program elements that comprise an aging management program. For the VYNPS AMPs for which the applicant claimed consistency with the AMPs included in the GALL Report, the project team will review the VYNPS AMP descriptions and compare program elements for the VYNPS AMPs to the corresponding program elements for the GALL Report AMPs. The review will be documented using the worksheet as discussed in Appendix F. The project team will determine that the VYNPS AMPs contain the program elements of the referenced GALL Report AMP and that the conditions at the plant are bounded by the conditions for which the GALL Report program was evaluated. 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 review by the project team.

For VYNPS AMPs that have one or more exceptions and/or enhancements, the project team will review each exception and/or enhancement to determine whether the exception and/or enhancement is acceptable and whether the VYNPS AMP, as modified by the exception and/or enhancement, would adequately manage the aging effects for which it is credited. The review will be documented using the worksheet as discussed in Appendix F. In some cases, the project team will identify differences that the applicant did not identify between the VYNPS AMPs credited by the applicant and the GALL Report AMPs. The review will be documented using the worksheet as discussed in Appendix F. In these cases, the project team will review the difference to determine whether or not it is acceptable and whether or not the VYNPS AMP, as modified with the difference, would adequately manage the aging effects.

For those VYNPS AMPs that are not included in the GALL Report (i.e., plant-specific AMPs, no precedent), the project team will review the VYNPS AMP against the ten program elements defined in Appendix A of the SRP-LR. The review will be documented using the worksheet shown in Appendix G. 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 review 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 (includes formerly past precedent material) are technically acceptable and applicable based on a technical review by the project team. 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.

In addition, the project team will also review the AMRs that the applicant claims that are not applicable to its plant.

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

The TLAAs in the VYNPS 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(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.

In addition, the project team will also review the TLAAs 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 TLAAs 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 TLAAs 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 TLAAAs 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/Examples for further review by technical specialists could be such as the following:

- Reactor Vessel Neutron Embrittlement Analysis
- EQ for Electrical Equipment (unless audit team is capable)
- Intergranular separation in the Heat-Affected Zone (HAZ) of Reactor Vessel
- Low-Alloy Steel under Austenitic SS Cladding
- Silting of the Ultimate Heat Sink

#### **5.4 NRC-Approved Precedents**

To help facilitate the project team staff review of its LRA, an applicant may reference NRC-approved precedents to demonstrate that its non-GALL programs correspond to reviews that the staff had approved for other plants during its review of previous applications for license renewal. When an applicant elects to provide precedent information, the project team will review and determine whether the material presented in the precedent is applicable to the applicant's facility, determine whether the plant program is bounded by the conditions for which the precedent was evaluated and approved, and determine that the plant program contains the program elements of the referenced precedent. In general, if the project team determines that these conditions are satisfied, it will use the information in the precedent to frame and focus its review of the applicant's program.

It is important to note that precedent information is not a part of the LRA; it is supplementary information voluntarily provided by the applicant as a reviewer's aid. The existence of a precedent, in and of itself, is not a sufficient basis to accept the applicant's program. Rather, the precedent facilitates the review of the substance of the matters described in the applicant's program. As such, in its documentation of its reviews of programs 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 program for which it is credited, it may refer the program to the Office of Nuclear Reactor Regulation (NRR) DE for review in the traditional manner, i.e., as described in the SRP-LR, without consideration of the precedent information.

#### **5.5 UFSAR Supplement Review**

In accordance with the SRP-LR, for the AMRs and associated AMPs and the TLAAAs 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 determine that they are acceptable for the stated purpose. In

addition, the project team will determine that the applicant identified the enhancements as commitments in the Updated Final Safety Analysis Report (UFSAR) or other docketed correspondence.

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

In performing its work, the project team will rely heavily on the VYNPS 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 documents, to determine that the applicant's activities and programs will adequately manage the effects of aging on structures and components. To review the TLAAs, the review team will also study the appropriate sections in the VYNPS UFSAR, as well as referring back to appropriate sections in the SRP-LR, GALL Report, and NEI 95-10, Revision 6.

## **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 these 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 document the results of his or her work on a variety of worksheets. The worksheets are discussed in Appendix F, "Consistent with GALL Report AMP Audit/Review Worksheet;" Appendix G, "Plant-Specific AMP Audit/Review Worksheet;" and Appendix H, "Aging Management Review Worksheets." The use of the worksheets is described in Section 6 of this audit and review plan.

### **5.8.3 Questions**

As specified in Section 6 of this audit and review plan, the project team will ask the applicant questions, while on-site, as appropriate, to facilitate its audit and review activities. The project team will also track and review the applicant's answers to these questions. If an applicant response is necessary to support a finding made by the project team, the applicant may voluntarily submit the response to the NRC under oath and affirmation. As an alternate, the project team may use the RAI process to obtain this response under oath and affirmation.

#### **5.8.4 Work Packages**

During the audit and review process, the project team leader, in conjunction with the NRC license renewal project manager, will assemble work packages for any work that the project team will refer to the NRR 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 Request for Additional Information**

The audit and review process described in this audit and review plan is structured to resolve as many questions as possible during the on-site visits. As examples, the on-site visits are used to obtain clarifications about the VYNPS LRA and explanations as to where certain information may be found in the VYNPS 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 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 project team receives a response to an RAI from the applicant, the project team leader will provide the response to the project team member who prepared the RAI. The project team will review the response and determine if it resolves the issue that was the reason for the RAI. The project team 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 and review report was issued before the applicant submitted its response to an RAI, the review of the project team's evaluation of the response will be documented in the SER related to the VYNPS LRA.

#### **5.8.6 Audit and Review Report**

The project team will document the results of its work in an audit and review report. The project team will prepare its report as described in Section 6.5.1 of this audit and review 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 6.5.2 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, conduct, and document its audit and review 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 renewal decision. Key milestones and activities include, as a minimum:

- A. receiving the LRA from the applicant
- B. receiving work split tables from the NRC license renewal project manager
- C. making individual work assignments
- D. training project team members
- E. holding the project team kickoff meeting
- F. preparing the audit and review plan
- G. scheduling on-site visits
- H. scheduling in-office review periods
- I. preparing questions
- J. preparing RAIs
- K. preparing draft and final audit and review report
- L. preparing draft and final SER input

On-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 NRC technical assistance contractor will provide a proposed project team member work assignments to the NRC project team leader. The NRC project team leader will approve all work assignments. After the audit and review plan is issued, the NRC project team leader may reassign work as necessary.

The NRC technical assistance contractor will develop assignment tables that show which project team member will review each of the VYNPS AMPs and AMRs. Appendix A of this audit and review plan shows the project team members. Appendix C shows the project team member assignments for the AMPs, Appendix D of this audit and review plan shows the project team member assignments for the AMRs, and 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 TLAAs
  - (6) LRA AMRs
  - (7) Basis documents (catalogs of information assembled by the applicant to demonstrate the bases for its programs and activities)
  - (8) Implementing procedures
  - (9) Operating experience (Licensee Event Reports)
  - (10) RAls, audit and review reports, and SERs for other plants
  - (11) Applicant's UFSAR
- 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, RAls, the audit and review report, and SER input.
  - F. Process for interfacing with DE and DCI technical reviewers.

## **6.2 Aging Management Program 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 audit and review plan.

#### **6.2.2 Scope of AMP Program Elements to be Audited And Reviewed**

Table 1 of this plan shows the ten program elements that are used to evaluate the adequacy of each aging management program. These program elements are also 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 audit and review each plant AMP that the applicant claims is consistent with the GALL Report.

### Preparation

- A. For the VYNPS AMP being reviewed, identify the corresponding GALL Report AMP.
- B. Review the associated GALL Report 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) ISG-LR
  - (4) RAIs, audit and review reports, and SERs for similar plants
  - (5) LRA
  - (6) basis documents
  - (7) implementation documents
  - (8) operating experience reports (plant-specific and industry)
  - (9) applicant's UFSAR

### Audit/Review

- A. Confirm that VYNPS 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 program elements consistent with the GALL Report AMP?
- B. If the above questions result in the identification of an exception/enhancement or a difference to the GALL Report 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 (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 five to ten years of operating and maintenance history should be sufficient. The results of the review should confirm consistency with reported industry operating experience. Differences with previously reported industry experience, such as new aging effects or lack of aging effects, allow for consideration in the plant-specific aging management requirements.

- (2) Plant-Specific Operating Experience with Existing Aging Management Programs. The operating experience of aging management programs, 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 issuance. Operating experience after the issuance date of NUREG-1801 should be evaluated and documented as part of the aging management review. In particular, generic communications such as a Bulletin or an Information Notice should be evaluated for impact upon the AMP. The evaluation should check for new aging effects or a new component or location experiencing an already identified aging effect.
- E. If it is necessary to ask the applicant a question to clarify the basis for accepting the justification, an exception, or a difference to the program element of the GALL Report, 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 VYNPS 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 F, "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, audit and review reports, and SERs for similar plants
  - (5) LRA
  - (6) basis documents
  - (7) implementation documents
  - (8) operating experience reports (plant-specific and industry)
  - (9) applicant's UFSAR
  - (10) lessons learned developed by RLRC

### Audit/Review

- A. Audit/review the VYNPS 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 five to ten years of operating and maintenance history should be sufficient. The results of the review should confirm consistency with reported industry operating experience. Differences with previously reported industry experience, such as new aging effects or lack of aging effects, allow for consideration in the plant-specific aging management requirements.
  - (2) Plant-Specific Operating Experience with Existing Aging Management Programs. The operating experience of aging management programs, 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 issuance. Operating experience after the issuance date of NUREG-1801 should be evaluated and documented as part of the aging management review. In particular, generic communications such as a Bulletin or an Information Notice should be evaluated for impact upon the AMP. The evaluation should check for new aging effects or a new component or location experiencing an already identified aging effect.
- C. If it is necessary to ask the applicant a question to clarify the basis for accepting the justification, an exception, or a difference to the program element of the GALL Report, follow the logic process shown in Figure 1.
- D. 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 VYNPS 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 G, "Plant-Specific AMP Audit/Review Worksheet."

### **6.3 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 VYNPS 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 Report AMRs and identify those line items that will be audited/reviewed in conjunction with each of the VYNPS 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, audit and review reports, and SERs for similar plants
- (5) LRA
- (6) basis documents
- (7) implementation documents
- (8) operating experience reports (plant-specific and industry)
- (9) applicant's 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 determination that the applicant has satisfied the requirements of 10 CFR 54.21(a)(3). This requirement states that, for "each structure and component [within the scope of license renewal], 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 extended period of 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

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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).

<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.

- 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.
    - (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 (docketed letter submitted under oath and affirmation) 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.
    - (d) If the applicant's response is relied upon as the basis for a finding made by the project team, the applicant's response needs to be docketed under oath and affirmation. This may be reached through the applicant voluntarily submitting the response to the NRC under oath and affirmation, or by the staff using the RAI process.
  - (8) Review LRA Table 3.X.1. 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.

#### AMR Audit/Review Worksheets

Document the audits/reviews of VYNPS AMRs using the worksheet provided in Appendix H, "Aging Management Review Worksheets." As an alternate, the project team reviewer may document its review electronically in the AMR spreadsheets.

### 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 VYNPS 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 documents
- (8) operating experience reports (plant-specific and industry)
- (9) applicant’s UFSAR
- (10) lessons learned developed by RLRC

#### Audit/Review

- A. The AMR audit/review involves determination 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 VYNPS AMR being reviewed?
  - (2) Is the NRC-approved precedent sufficiently documented or understood to technically support the adequacy of the VYNPS AMR being reviewed?
  - (3) Is the VYNPS 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 VYNPS AMR, the process shown in Figure 4

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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.

- 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 H, "Aging Management Review Worksheets. As an alternate, the project team member may document its review electronically in the AMR spreadsheets.

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

Audit and review of TLAAs are discussed below. The project team will also review the TLAAs 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 TLAAs 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 TLAAs 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 TLAAs 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 VYNPS 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 VYNPS TLAAs.
- C. Review the list of the VYNPS 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:

- C Excel database on TLAAAs summarizing how earlier LRAs and SERs presented and reviewed
  - C TLAAAs
  - C GALL Report
  - C SRP-LR
  - C ISGs
  - C RAIs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents
  - C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant's UFSAR
- E. In addition, the project team will also review the TLAAAs 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 TLAAAs 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 TLAAAs 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 TLAAAs 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:
- C Reactor Vessel Neutron Embrittlement Analysis
  - C EQ for Electrical Equipment (unless audit team is capable)
  - C Intergranular separation in the Heat-Affected Zone (HAZ) of Reactor Vessel
  - C Low-Alloy Steel under Austenitic SS Cladding
  - C Silting of the Ultimate Heat Sink

#### Audit/Review

- A. Confirm that each VYNPS 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 VYNPS 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:



- C 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.
  - C 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.
  - C The application shall include a list of 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.
  - C Summary descriptions of the evaluations of TLAAs 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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team's question(s) related to the particular TLAA, the applicant's response(s) and notation of documents reviewed.

#### **6.4.2 Reactor Vessel Neutron Embrittlement Analyses**

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 TLAAAs identified in the VYNPS LRA to be within the NUREG-1800 TLAA category of “reactor vessel neutron embrittlement” 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:
  - C Excel database on TLAAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAAs
  - C GALL Report
  - C SRP-LR
  - C ISGs
  - C RAIs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents
  - C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant’s UFSAR
- C. In addition, the project team will also review the VYNPS TLAAAs within the NUREG-1800 TLAA category of “reactor vessel neutron embrittlement” 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 TLAAAs 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 TLAAAs 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 TLAAAs 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 VYNPS 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 VYNPS 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 VYNPS 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 reactor vessel neutron embrittlement (from NEI 95-10, Table 6.2-2) as follows:
  - C Disposition chosen for each of the identified TLAA's. Also, provide a reference to the summary description of TLAA evaluations in the UFSAR 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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

### TLAA Audit Worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team's question(s) related to the particular TLAA, the applicant's response(s) and notation of documents reviewed.

### 6.4.3 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 VYNPS 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).
- B. Identify and locate the documents needed to perform the review. These may include, but are not limited to, the following:
  - C Excel database on TLAAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAAs
  - C GALL Report, especially Section X.M1
  - C SRP-LR
  - C ISGs
  - C RAIs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents
  - C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant’s UFSAR
- C. In addition, the project team will also review the VYNPS TLAAAs 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 TLAAAs 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 TLAAAs 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 TLAAAs 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 VYNPS 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 VYNPS 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 VYNPS 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:
  - C Disposition chosen for each of the identified TLAA's. Also, provide a reference to the summary description of TLAA evaluations in the UFSAR 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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

## TLAA Audit Worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team's question(s) related to the particular TLAA, the applicant's response(s) and notation of documents reviewed.

### **6.4.4 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 VYNPS 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:
  - C Excel database on TLAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAs
  - C GALL Report, especially Section X.E1
  - C SRP-LR
  - C ISGs
  - C RAIs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents
  - C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant's UFSAR
- C. In addition, the project team will also review the VYNPS TLAAs 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 TLAAs 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 TLAAs 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 TLAAAs 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 VYNPS 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 VYNPS 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 VYNPS 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:
  - C Disposition chosen for each of the identified TLAAAs. Also, provide a reference to the summary description of TLAA evaluations in the UFSAR 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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team's question(s) related to the particular TLAA, the applicant's response(s) and notation of documents reviewed.

#### **6.4.5 Concrete Containment Tendon Prestress Analysis**

The applicant states in the VYNPS LRA that this TLAA is not applicable for VYNPS. So the material in the following paragraphs is not pertinent to the project team review for this LRA.

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 VYNPS LRA to be within the NUREG-1800 TLAA category of "concrete containment tendon prestress" 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:
- C Excel database on TLAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAs
  - C GALL Report, especially Section X.S1
  - C SRP-LR
  - C ISGs
  - C RAIs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents
  - C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant's UFSAR
- C. In addition, the project team will also review the VYNPS TLAAs within the NUREG-1800 TLAA category of "concrete containment tendon prestress" 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 TLAAs 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 TLAAs 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 TLAAs 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 VYNPS 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 VYNPS 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 VYNPS 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 “concrete containment tendon prestress” (from NEI 95-10, Table 6.2-2) as follows:
  - C Disposition chosen for each of the identified TLAA's. Also, provide a reference to the summary description of TLAA evaluations in the UFSAR

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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team's question(s) related to the particular TLAA, the applicant's response(s) and notation of documents reviewed.

#### **6.4.6 Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses**

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 VYNPS LRA to be within the NUREG-1800 TLAA category of "containment liner plate, metal containments, and penetrations fatigue analysis" 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:
  - C Excel database on TLAAs summarizing how earlier LRAs and SERs presented and reviewed TLAAs
  - C GALL Report, especially Section X.E1
  - C SRP-LR
  - C ISGs
  - C RAIs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents

- C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant's UFSAR
- C. In addition, the project team will also review the VYNPS TLAAs within the NUREG-1800 TLAA category of "containment liner plate, metal containments, and penetrations fatigue analysis" 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 TLAAs 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 TLAAs 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 TLAAs 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 VYNPS 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 VYNPS 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 VYNPS 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 “containment liner plate, metal containments, and penetrations fatigue analysis” (from NEI 95-10, Table 6.2-2) as follows:
  - C Disposition chosen for each of the identified TLAA's. Also, provide a reference to the summary description of TLAA evaluations in the UFSAR 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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA audit worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team's question(s) related to the particular TLAA, the applicant's response(s) and notation of documents reviewed.

### **6.4.7 Other Plant-Specific TLAA's**

Figure 5, “Evaluation of TLAA's and Exemptions,” taken from NEI 95-10, Revision 6, shows the process of evaluating and reviewing TLAA's 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 TLAA's identified in the VYNPS LRA to be within the NUREG-1800 TLAA category of “other plant-specific TLAA's” 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:
  - C Excel database on TLAA's summarizing how earlier LRAs and SERs presented and reviewed TLAA's
  - C GALL Report
  - C SRP-LR
  - C ISGs

- C RAs, audit and review reports, and SERs for similar plants
  - C LRA
  - C References listed by applicant for each TLAA
  - C NEI 95-10, Section 5.1 and Table 6.2-2
  - C basis documents
  - C implementation documents
  - C operating experience reports (plant-specific and industry)
  - C lessons learned developed by RLRC
  - C applicant's UFSAR
- C. In addition, the project team will also review the VYNPS TLAAs within the NUREG-1800 TLAA category of "other plant-specific TLAAs" 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 TLAAs 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 TLAAs 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 TLAAs 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 VYNPS 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 VYNPS 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 VYNPS 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 TLAAs” (from NEI 95-10, Table 6.2-2) as follows:
  - C Identify and evaluate any plant-specific TLAAs.
- 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 VYNPS LRA. If not, the NRC may issue an RAI to obtain the information.

#### TLAA Audit Worksheets

Document the audits/reviews using a worksheet which contains, as a minimum, the project team’s question(s) related to the particular TLAA, the applicant’s response(s) and notation of documents reviewed.

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

As noted in Section 5.7 of this audit and review 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 audit and review plan addresses the preparation of the audit and review report and the SER input.

#### **6.4.1 Audit and Review Report**

Details on documentation of the audit and review report can be found in the latest version of the *RLRC Guidelines For Preparing Audit and Review Reports*.

In general, the audit and review report should include the following:

- A. Cover page
- B. Table of Contents
- C. 1. Introduction and General Information
  - 1.1 Introduction
  - 1.2 Background



- D. 2. Audit and Review Scope
- E. 3. Aging Management Review Audit and Review Results
  - 3.0 Applicant's Use of Generic Aging Lesson-Learned Report
    - 3.0.1 Format of the Applicant's License Renewal Application
      - 3.0.1.1 Overview of Table 1
      - 3.0.1.2 Overview of Table 2
    - 3.0.2 Audit and Review Process
      - 3.0.2.1 Review of AMPs
      - 3.0.2.2 Review of AMR Results
      - 3.0.2.3 NRC-Approved Precedents
      - 3.0.2.4 UFSAR Supplement
      - 3.0.2.5 Documentation and Documents Reviewed
      - 3.0.2.6 Commitments to be Included in the Safety Evaluation Report
      - 3.0.2.7 Exit Meeting
    - 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 the GALL Report with Exceptions or Enhancements
      - 3.0.3.3 AMPs That Are Not Consistent with or Not Addressed in the GALL Report
  - 3.1 Applicant's LRA Section 3.1 - Aging Management of Reactor Coolant System
    - 3.1.1 Summary of Technical Information in the Application
    - 3.1.2 Project Team Evaluation
      - 3.1.2.1 AMR Results That Are Consistent with the GALL Report
      - 3.1.2.2 AMR Results for Which Further Evaluation is Recommended
      - 3.1.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report
    - 3.1.3 Conclusion
  - 3.2 Applicant's LRA Section 3.2 - Aging Management of Engineered Safety Features Systems
    - 3.2.1 Summary of Technical Information in the Application
    - 3.2.2 Project Team Evaluation
      - 3.2.2.1 AMR Results That Are Consistent with the GALL Report
      - 3.2.2.2 AMR Results for Which Further Evaluation is Recommended
      - 3.2.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report
    - 3.2.3 Conclusion
  - 3.3 Applicant's LRA Section 3.3 - Auxiliary Systems
    - 3.3.1 Summary of Technical Information in the Application
    - 3.3.2 Project Team Evaluation
      - 3.3.2.1 AMR Results That Are Consistent with the GALL Report

- 3.3.2.2 AMR Results for Which Further Evaluation is Recommended
        - 3.3.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report
      - 3.3.3 Conclusion
    - 3.4 Applicant's LRA Section 3.4 - Aging Management of Steam and Power Conversion System
      - 3.4.1 Summary of Technical Information in the Application
      - 3.4.2 Project Team Evaluation
        - 3.4.2.1 AMR Results That Are Consistent with the GALL Report
        - 3.4.2.2 AMR Results for Which Further Evaluation is Recommended
        - 3.4.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report
      - 3.4.3 Conclusion
    - 3.5 Applicant's LRA Section 3.5 - Aging Management of Containment, Structures and Component Supports
      - 3.5.1 Summary of Technical Information in the Application
      - 3.5.2 Project Team Evaluation
        - 3.5.2.1 AMR Results That Are Consistent with the GALL Report
        - 3.5.2.2 AMR Results for Which Further Evaluation is Recommended
        - 3.5.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report
      - 3.5.3 Conclusion
    - 3.6 Applicant's LRA Section 3.6 - Aging Management of Electrical and Instrumentation and Controls
      - 3.6.1 Summary of Technical Information in the Application
      - 3.6.2 Project Team Evaluation
        - 3.6.2.1 AMR Results That Are Consistent with the GALL Report
        - 3.6.2.2 AMR Results for Which Further Evaluation is Recommended
        - 3.6.2.3 AMR Results That Are Not Consistent with or Not Addressed in the GALL Report
      - 3.6.3 Conclusion
- F. 4. Time-Limited Aging Analysis
- 4.1 Identification of Time-Limited Aging Analyses and Exemptions
    - 4.1.1 Identification of TLAA
    - 4.1.2 Identification of Exemptions
  - 4.2 Reactor Vessel Neutron Embrittlement Analyses
    - 4.2.1 Reactor Vessel Fluence
    - 4.2.2 Pressure/Temperature Limits
    - 4.2.3 Charpy Upper-Shelf Energy (CVUSE)
    - 4.2.4 Adjusted Reference Temperature

- 4.2.5 Reactor Vessel Circumferential Welds
- 4.2.6 Reactor Vessel Axial Weld Failure Probability
- 4.2.7 References

- 4.3 Metal Fatigue Analyses
  - 4.3.1 Class 1 Fatigue
  - 4.3.2 Non-Class 1 Fatigue
  - 4.3.3 Effects of Reactor Water Environment on Fatigue Life
  - 4.3.4 References

- 4.4 Environmental Qualification of Electrical Components

- 4.5 Concrete Containment Tendon Prestress Analysis

- 4.6 Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses
  - 4.6.1 Fatigue of the Torus
  - 4.6.2 Fatigue of Safety Relief Valve (SRV) Discharge Piping
  - 4.6.3 Fatigue of Other Torus-Attached Piping

- 4.7 Other Plant-specific Time-limited Aging Analyses
  - 4.7.1 Reflood Thermal Shock of the Reactor Vessel Internals
  - 4.7.2 TLAA in BWRVIP Documents
  - 4.7.3 References

G. Attachments

- Attachment 1 Abbreviations and Acronyms
- Attachment 2 Project Team and Applicant Personnel
- Attachment 2A Members of the Public
- Attachment 3 Elements of an Aging Management Program for License Renewal
- Attachment 4 Disposition of Requests for Additional Information, LRA Supplements, and Open or Confirmatory Items
- Attachment 5 List of Documents Reviewed
- Attachment 6 List of Commitments

## 6.4.2 Safety Evaluation Report Input

- 1. General guidance
  - A. The project team will prepare the SER input for the AMP and AMR audits and reviews. The technical assistance contractor shall collect, assemble, and prepare the complete SER input.
  - B. 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 project team member's worksheets.

- C. SER inputs are to be prepared for:
- (1) each VYNPS AMP that was determined to be consistent with the GALL Report, which has no exceptions or enhancements.
  - (2) each VYNPS 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.
  - (3) each plant-specific AMP
  - (4) AMRs that are consistent with the GALL Report
  - (5) project team AMR review results<sup>4</sup>
- D. RLRA/RLRB will prepare an SER shell for the entire SER. The project team is to enter its SER input directly into the RLRA/RLRB shell. The SER input placed into the SER shell should typically contain the following sections. (Note: The following section numbers (3. through 3.X.3 and 4) are based on the numbering system for the SER shell. 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
    - 3.0.1 Format of the LRA
    - 3.0.2 Staff's Review Process
      - 3.0.2.1 AMRs in the GALL Report
      - 3.0.2.2 NRC-Approved Precedents
      - 3.0.2.3 UFSAR Supplement
      - 3.0.2.4 Documentation and Documents Reviewed
    - 3.0.3 Aging Management Programs
      - 3.0.3.1 AMPs that are Consistent With the GALL Report
      - 3.0.3.2 AMPs that are Consistent With GALL Report With Exceptions or Enhancements
      - 3.0.3.3 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
      - 3.X.2.1 Aging Management Review Results that are Consistent with the GALL Report

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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.2.2 Aging Management Review Results For Which Further Evaluation is Recommended by the GALL Report
    - 3.X.2.3 Aging Management Review Results that are Not Consistent with or Not Addressed in the GALL Report
  - 3.X.3 Conclusion
- 4. Time-Limited Aging Analyses
  - 4.1 Identification of Time-Limited Aging Analyses and Exemptions
    - 4.1.1 Identification of TLAA
    - 4.1.2 Identification of Exemptions
  - 4.2 Reactor Vessel Neutron Embrittlement Analysis
    - 4.2.1 Reactor Vessel Fluence
    - 4.2.2 Pressure/Temperature Limits
    - 4.2.3 Charpy Upper-Shelf Energy (CVUSE)
    - 4.2.4 Adjusted Reference Temperature
    - 4.2.5 Reactor Vessel Circumferential Welds
    - 4.2.6 Reactor Vessel Axial Weld Failure Probability
    - 4.2.7 References
  - 4.3 Metal Fatigue Analysis
    - 4.3.1 Class 1 Fatigue
    - 4.3.2 Non-Class 1 Fatigue
    - 4.3.3 Effects of Reactor Water Environment on Fatigue Life
    - 4.3.4 References
  - 4.4 Environmental Qualification of Electrical Components
  - 4.5 Concrete Containment Tendon Prestress Analysis
  - 4.6 Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses
    - 4.6.1 Fatigue of the Torus
    - 4.6.2 Fatigue of Safety Relief Valve (SRV) Discharge Piping
    - 4.6.3 Fatigue of Other Torus-Attached Piping
  - 4.7 Other Plant-specific Time-limited Aging Analyses
    - 4.7.1 Reflood Thermal Shock of the Reactor Vessel Internals
    - 4.7.2 TLAA in BWRVIP Documents
    - 4.7.3 References

- E. For each AMP audited/reviewed by the project team, the SER input shall include a discussion of the project team's review of the operating experience program element.
- F. If the applicant submitted a supplement (docketed letter submitted under oath and affirmation) 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.
- G. 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.
- H. 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.

## 2. SER input

- A. For VYNPS 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 VYNPS LRA) is acceptable. This SER input documents that the AMP is consistent with the GALL Report.
- B. For VYNPS 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 VYNPS 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.
- C. For plant-specific AMPs, the SER input should document the basis for accepting each the program elements reviewed by the project team. The SER input should also include a discussion concerning the adequacy of the UFSAR supplement.
- D. For aging management evaluations that are consistent with the GALL Report,<sup>6</sup> the SER input should include the following:

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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.

- (1) Identify the VYNPS LRA section reviewed
- (2) A summary of the type of information provided in the section of the VYNPS LRA reviewed, including a listing of the VYNPS AMPs reviewed.
- (3) Identify the VYNPS LRA Tables 3.X.2-Y reviewed.
- (4) A summary review of the AMR Notes A through E used to classify the AMR line items used in these tables.
- (5) 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.
- (6) The bases for accepting any exceptions to GALL Report AMRs that were identified by the applicant or the project team member.
- (7) A finding that determines that:
  - (a) the applicant identified the applicable aging effects
  - (b) the applicant defined the appropriate combination of materials and environments
  - (c) the applicant specified acceptable AMPs
- (8) 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.

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

- (1) The VYNPS LRA section containing the applicant's further evaluations of AMRs for which further evaluation is required.
- (2) A list of the aging effects for which the further evaluation apply.
- (3) 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.
- (4) 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.
- (5) 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.

F. 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:

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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.



- (1) The VYNPS LRA section reviewed
- (2) 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.
- (3) Identify the VYNPS LRA Tables 3.X.2-Y documented by this audit writeup.
- (4) A brief summary of what the staff (project team) reviewed, i.e., LRA and applicant basis documents and other implementation documents.
- (5) A finding that determines, if true, that:
  - (a) The applicant identified the applicable aging effects
  - (b) The applicant listed the appropriate combination of materials and environments
  - (c) The applicant specified acceptable AMPs
- (6) 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.

- G. Staff TLAA Review Results. For TLAAs 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:
- C Reactor Vessel Neutron Embrittlement Analysis
  - C EQ for Electrical Equipment (unless audit team is capable)
  - C Intergranular separation in the Heat-Affected Zone (HAZ) of Reactor Vessel
  - C Low-Alloy Steel under Austenitic SS Cladding
  - C Silting of the Ultimate Heat Sink

## 6.5 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 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.

**Table 1. Aging Management Program Element Descriptions**

<b>Element</b>		<b>Description</b>
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.

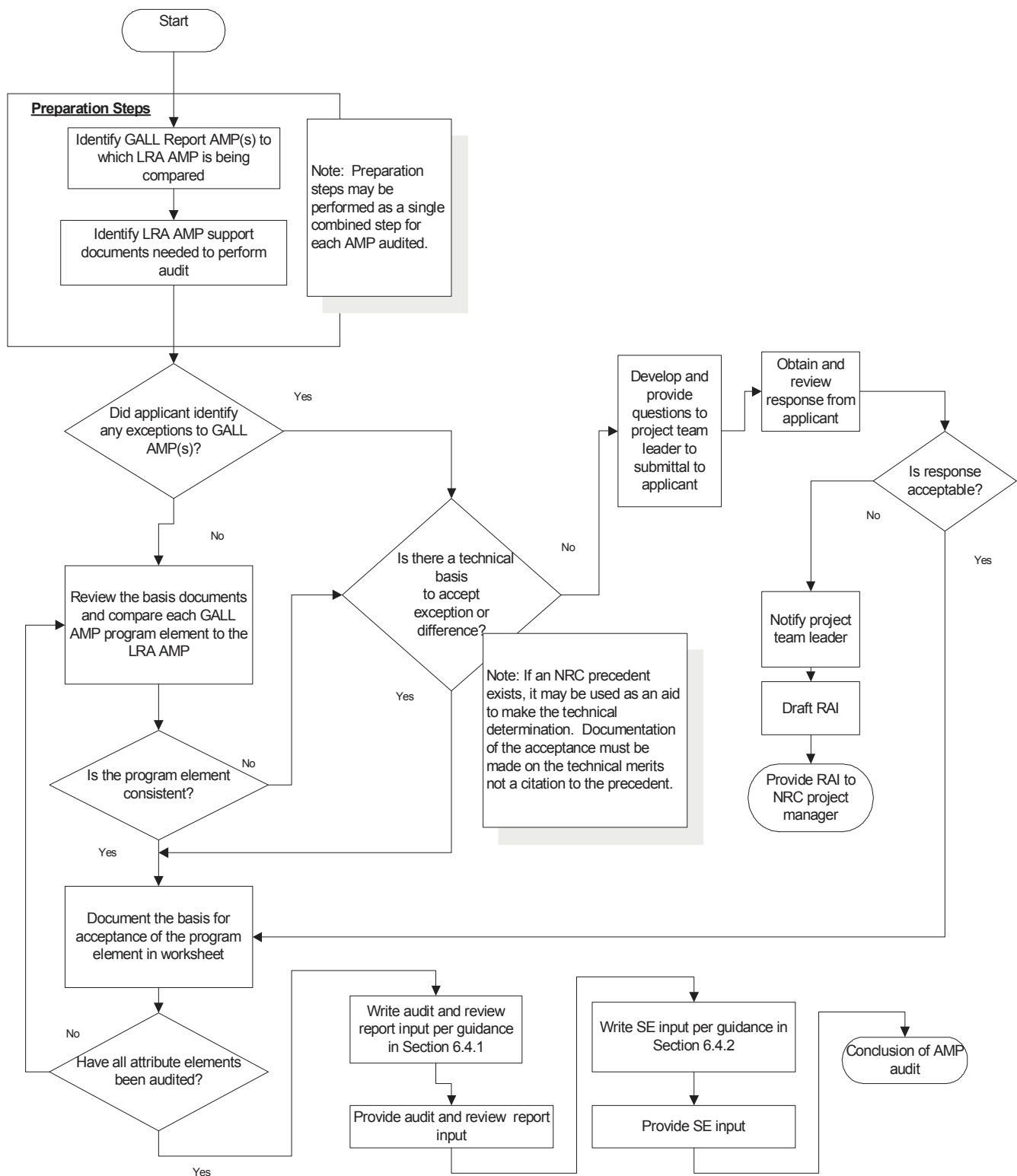
\* The adequacy of the applicant's 10 CFR 50, Appendix B Program associated with this program element is audited by the Division of Engineering.

**Table 2. Notes for License Renewal Application Tables 3.X.2-Y<sup>8</sup>**

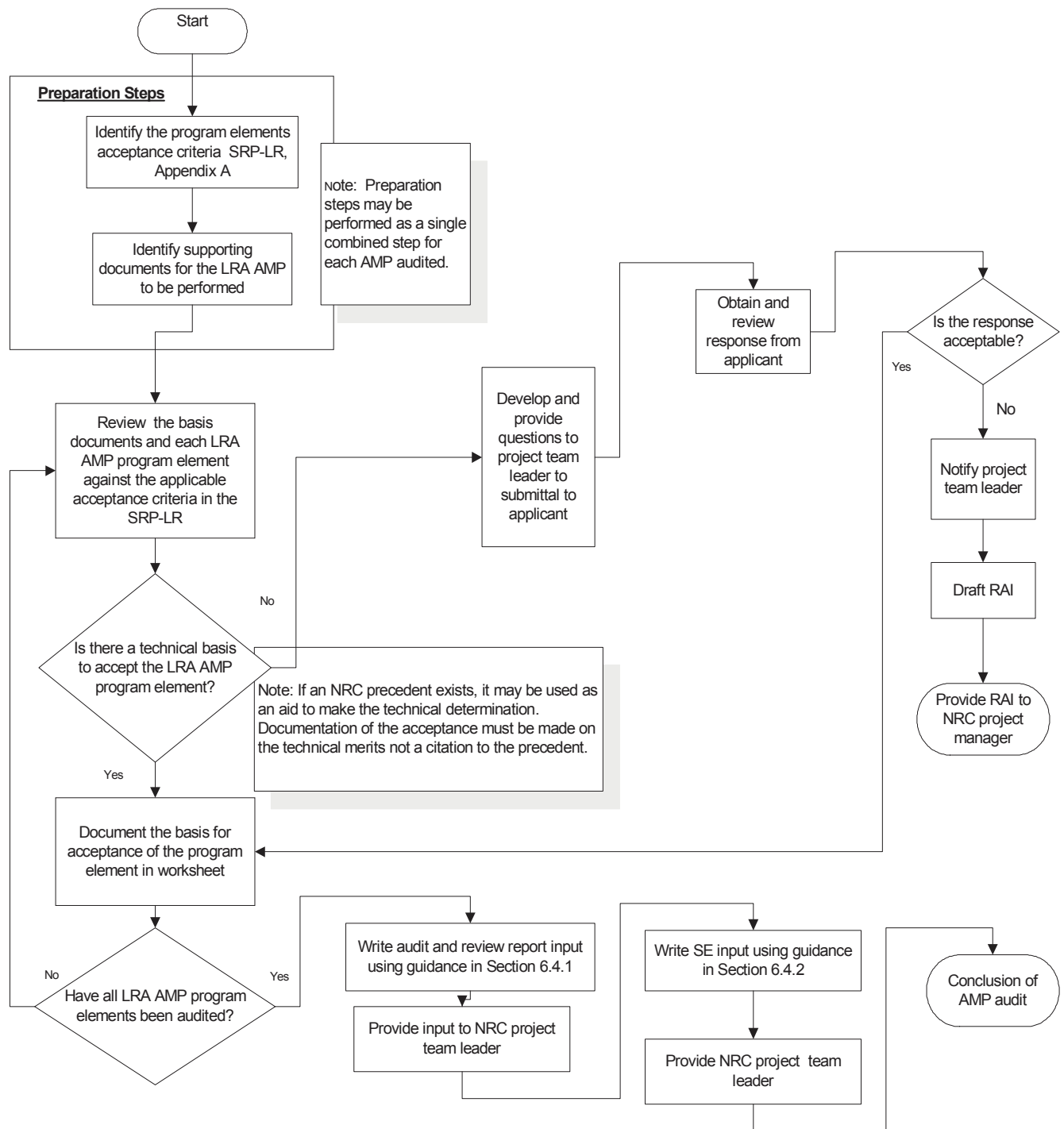
Note	Description
A	Consistent with NUREG-1801 [GALL Report] item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP.
B	Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP takes some exceptions to NUREG-1801 AMP.
C	Component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

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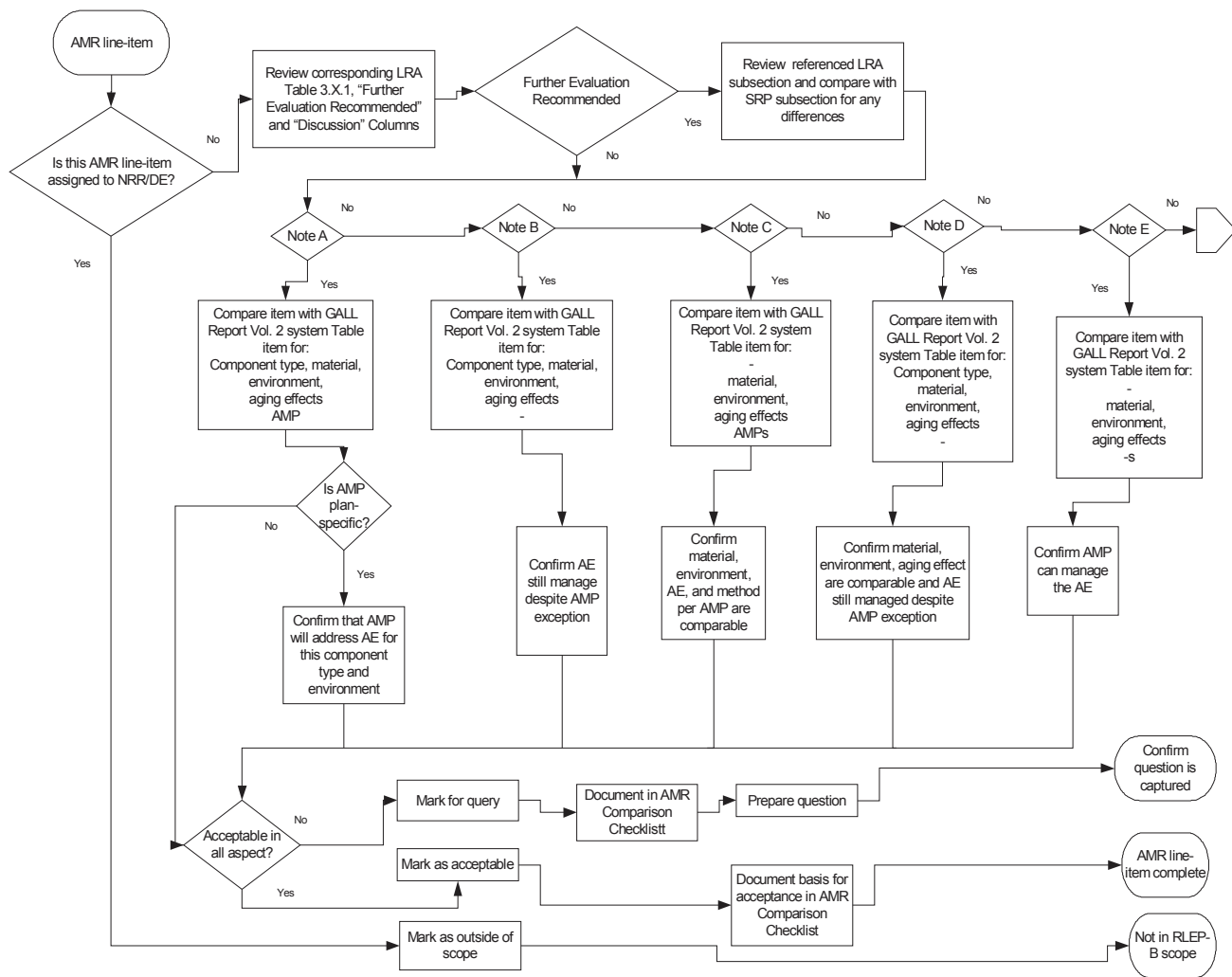
<sup>8</sup> Each AMR line item is coded with a letter which represents a standard note designation based on a letter from A. Nelson, NEI, to P.T. Kuo, NRC, "U.S. Nuclear Industry's Proposed Standard License Renewal Application Format Package, Request NRC Concurrence," dated January 24, 2003 (ML030290201). 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).



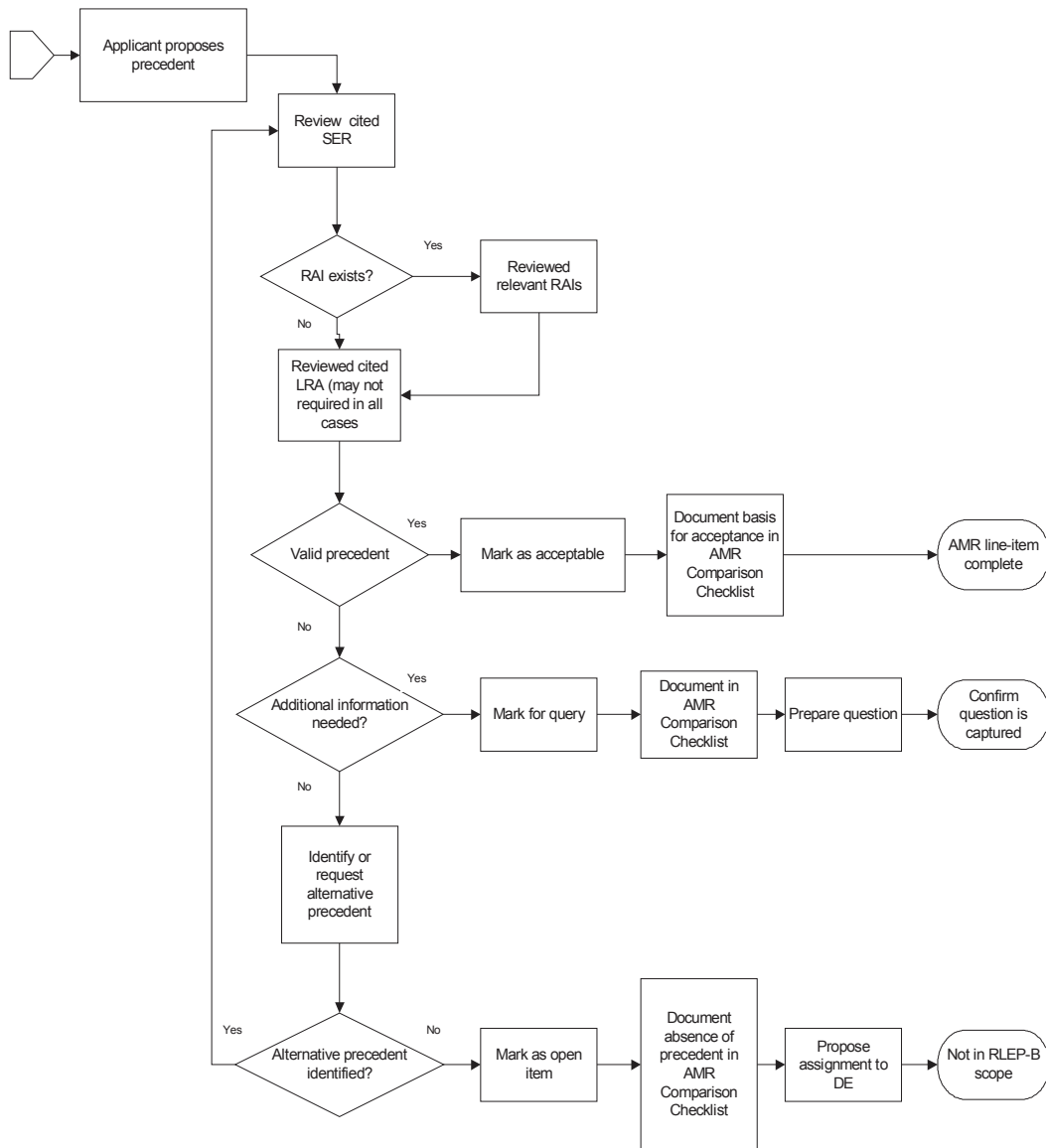
**Figure 1. Audit of AMPs That Are Consistent With the GALL Report**



**Figure 2. Audit of Plant-Specific AMPs**



**Figure 3. Review of AMRs That Are Consistent With the GALL Report**



**Figure 4. Review of AMRs Using NRC-Approved Precedents**



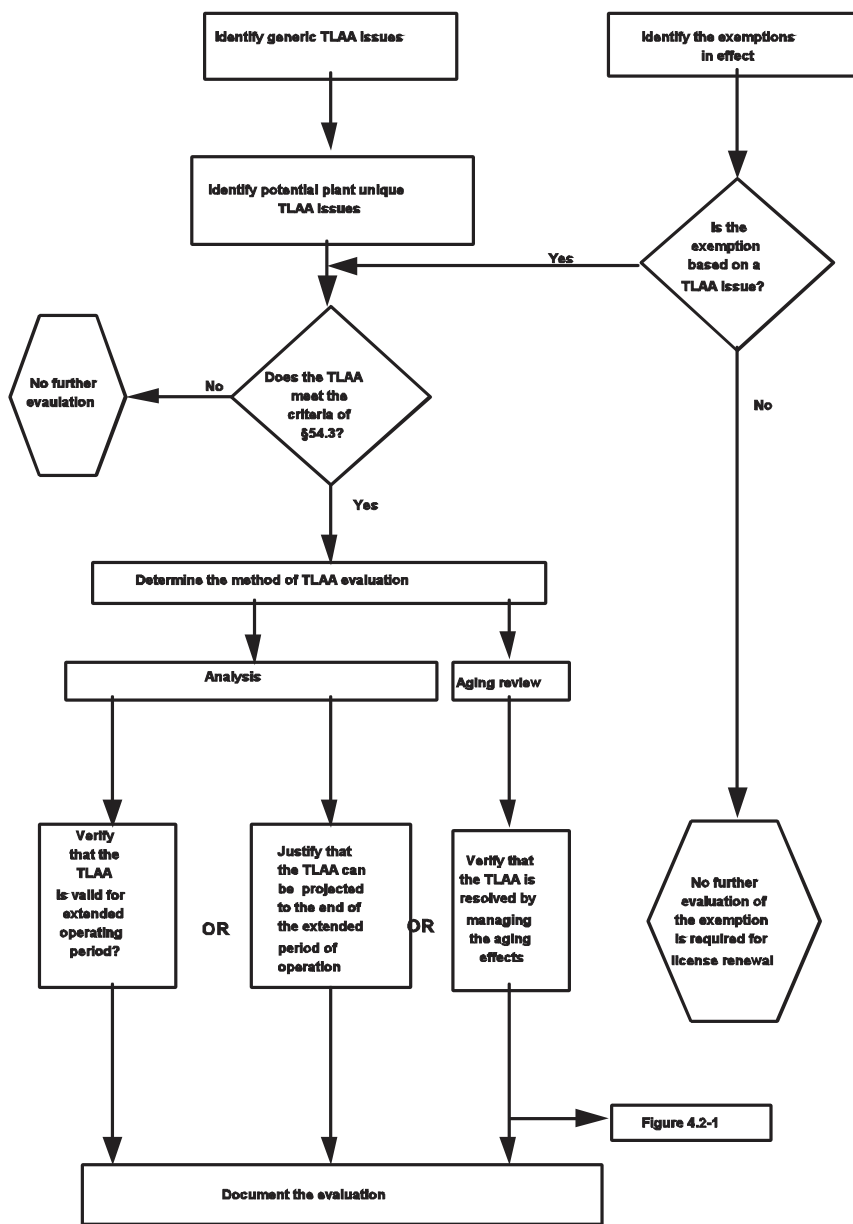


Figure 5. Review of TLAA and Exemptions (from NEI 95-10, Revision 6)

## **Appendix A**

### **Project Team Members**

## Appendix A

### Project Team Members

Organization	Name	Function
NRC/NRR/DLR/RLRC	Mike Morgan	Project Team Leader
NRC/NRR/DLR/RLRC	Kaihwa (Robert) Hsu	Backup Team Leader
NRC/NRR/DLR/RLRC	Mark Lintz	Reviewer
NRC/NRR/DLR/RLRC	Duc Nguyen	Reviewer
Information Systems Laboratories, Inc.	Mike Kennedy	Contractor Lead, Reviewer
Information Systems Laboratories, Inc.	Malcolm Patterson	Reviewer
Information Systems Laboratories, Inc.	Jon Woodfield	Reviewer

## **Appendix B**

### **RLRC Schedule for LRA Safety Review**

## Appendix B

### RLRC Schedule for LRA Safety Review

**Plant:** Vermont Yankee  
**Team Leader:** Michael Morgan  
**Backup Team Leader:** Kaihwa (Robert) Hsu  
**Project Manager:** Johnny Eads  
**Contractor:** Information Systems Laboratories (ISL)  
**Assignments:** Mike Kennedy (ISL), Malcolm Patterson (ISL), Jon Woodfield (ISL), Mark Lintz (NRC) Duc Nguyen (NRC)

**TAC:** MC9668  
**Scope of Work:**  
**AMPs/TLAAs** - 36 of 37  
**AMRs** - 2378 of 2378 line items  
**RAI Target Date:** 11/01/06  
**SE Input to PM:** 02/01/07

ACTIVITY/MILESTONE		PLAN SCHEDULE
1	Receive LRA	1/25/2006
2	Complete Acceptance Review	2/25/2006
3	Make Review Assignments	3/8/2006
4	Conduct Team Planning Meeting	3/21-3/22/2006
5	Issue Audit Plan to PM	3/31/2006
6	Conduct Site Visit 1 (AMP audit and review)	4/17-4/21/2006
7	Draft AMP Audit Report Input	5/1-5/5/2006
8	Conduct in-office AMR reviews	5/8-5/12/2006
9	Site Visit 2 (AMR audit and review)	5/15-5/19/2006
10	Draft AMR Audit Report Input	6/5-6/9/2006
11	Optional Site Visit 3 (resolve AMR and AMP questions)	6/26-6/29/2006
12	Public Exit Meeting	6/29/2006
13	Cutoff for providing RAIs to PM	
14	Peer Review of Final Draft Audit and Review Report	7/24-7/28/2006
15	Issue Final Audit and Review Report	8/4/2006
16	Draft SER input (AMPs/AMRs)	8/9-9/11/2006
17	Issue Final Draft SER Input to PM	9/15/2006
18	ACRS Subcommittee Meeting	5/1/2007
19	ACRS Full Committee Meeting	9/1/2007

## **Appendix C**

### **Aging Management Program Assignments**

## Appendix C

### Aging Management Program Assignments

The following AMPs have been assigned to the project team for review.

LRA AMP Number	GALL Report AMP Number	AMP Title	Consistent with GALL Report		Assigned Reviewer
			Yes	No	
B.1.1	XI.M34	Buried Piping Inspection Program		X	Mark Lintz
B.1.2	XI.M6	BWR CRD Return Line Nozzle Program		X	Malcolm Patterson
B.1.3	XI.M5	BWR Feedwater Nozzle Program		X	Malcolm Patterson
B.1.4	XI.M8	BWR Penetrations Program		X	Robert Hsu
B.1.5	XI.M7	BWR Stress Corrosion Cracking Program		X	Robert Hsu
B.1.6	XI.M4	BWR Vessel ID Attachment Welds Program		X	Robert Hsu
B.1.7	XI.M9	BWR Vessel Internals Program		X	Robert Hsu
B.1.8	XI.S4	Containment Leak Rate Program		X	Mark Lintz
B.1.9	XI.M30	Diesel Fuel Monitoring Program		X	Mike Kennedy
B.1.10	X.E1	Environmental Qualification (EQ) of Electric Components Program	Yes		Duc Nguyen
B.1.11	X.M1	Fatigue Monitoring Program		X	Malcolm Patterson
B.1.12.1	XI.M26	Fire Protection - Fire Protection Program		X	Mark Lintz
B.1.12.2	XI.M27	Fire Protection - Fire Water System Program		X	Mark Lintz
B.1.13	XI.M17	Flow-Accelerated Corrosion Program	Yes		Mark Lintz
B.1.14	NA	Heat Exchanger Monitoring Program	PS		Mike Kennedy



LRA AMP Number	GALL Report AMP Number	AMP Title	Consistent with GALL Report		Assigned Reviewer
			Yes	No	
B.1.15.1	XI.S1	Inservice Inspection - Containment Inservice Inspection (CII) Program	PS		Jon Woodfield
B.1.15.2	XI.M1 XI.S3	Inservice Inspection - Inservice Inspection (ISI) Program	PS		Malcolm Patterson
B.1.16	NA	Instrument Air Quality Program	PS		Malcolm Patterson
B.1.17	XI.E3	Non-EQ Inaccessible Medium-Voltage Cable Program	Yes		Duc Nguyen
B.1.18	XI.E2	Non-EQ Instrumentation Circuits Test Review Program	Yes		Duc Nguyen
B.1.19	XI.E1	Non-EQ Insulated Cables and Connections Program	Yes		Duc Nguyen
B.1.20	XI.M39	Oil Analysis Program		X	Mike Kennedy
B.1.21	XI.M32 XI.M35	One-Time Inspection Program	Yes		Mike Kennedy
B.1.22	NA	Periodic Surveillance and Preventive Maintenance Program	PS		Mike Morgan
B.1.23	XI.M3	Reactor Head Closure Studs Program		X	Mike Morgan
B.1.24	XI.M31	Reactor Vessel Surveillance Program	Yes		DE
B.1.25	XI.M33	Selective Leaching Program	Yes		Malcolm Patterson
B.1.26	XI.M20	Service Water Integrity Program		X	Jon Woodfield
B.1.27.1	XI.S5	Structures Monitoring - Masonry Wall Program	Yes		Jon Woodfield
B.1.27.2	XI.S6	Structures Monitoring - Structures Monitoring Program	Yes		Jon Woodfield

LRA AMP Number	GALL Report AMP Number	AMP Title	Consistent with GALL Report		Assigned Reviewer
			Yes	No	
B.1.27.3	NA	Structures Monitoring - Vernon Dam FERC Inspection	PS		Jon Woodfield
B.1.28	XI.M36	System Walkdown Program	Yes		Mark Lintz
B.1.29	XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program	Yes		Robert Hsu
B.1.30.1	NA	Water Chemistry Control - Auxiliary Systems Program	PS		Mike Morgan
B.1.30.2	XI.M2	Water Chemistry Control - BWR Program	Yes		Mike Morgan
B.1.30.3	XI.M21	Water Chemistry Control - Closed Cooling Water Program	Yes		Mike Morgan
DE = Division of Engineering PS = plant-specific X = with exceptions					

## **Appendix D**

### **Aging Management Review Assignments**

## Appendix D

### Aging Management Review Assignments

AMR Section	Title	Reviewer
3.1	Reactor Vessel, Internals, and Reactor Coolant System	M. Patterson
3.2	Engineering Safety Features Systems	M. Lintz
3.3	Auxiliary Systems	M. Kennedy
3.4	Steam and Power Conversion Systems	M. Morgan
3.5	Structures and Component Supports	J. Woodfield
3.6	Electrical and Instrumentation and Controls	D. Nguyen

## **Appendix E**

### **Time-Limited Aging Analyses Review Assignments**

## Appendix E

### Time-Limited Aging Analyses Review Assignments

LRA TLAA Number	GALL Report TLAA Number	TLAA Title	Assigned Reviewer
4.1	---	Identification of TLAA's and Exemptions	Hsu
4.2	---	Reactor Vessel Neutron Embrittlement	DE
4.3	X.M1	Metal Fatigue	Hsu
4.4	X.E1	Environmental Qualification of Electrical Components	Nguyen
4.5	X.S1	Concrete Containment Tendon Prestress	Not applicable to VYNPS
4.6	---	Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analyses	DE/Hsu
4.7.1	---	Reflood Thermal Shock of the Reactor Vessel Internals	DE
4.7.2.1	---	BWRVIP-05, RPV Circumferential Welds Analysis	DE
4.7.2.2	---	BWRVIP-25, Core Plate Rim Holddown Bolts Loss of Preload Analysis	DE
4.7.2.3	---	BWRVIP-38, Shroud Support Fatigue Analysis	Hsu
4.7.2.4	---	BWRVIP-47, Lower Plenum Fatigue Analysis	Hsu
4.7.2.5	---	BWRVIP-48, Vessel ID Attachment Welds Fatigue Analysis	Hsu
4.7.2.6	---	BWRVIP-49, Instrument Penetrations Fatigue Analysis	Hsu
4.7.2.7	---	BWRVIP-74, Reactor Vessel P/T Curves Analysis Fatigue Analysis CVUSE Analysis Circ/Axial Welds Analysis	DE
4.7.2.8	---	BWRVIP-76, Core Shroud	Hsu

## **Appendix F**

**Consistent with GALL Report AMP Audit/Review Worksheet**



## **Appendix F**

### **Consistent with GALL Report AMP Audit/Review Worksheet**

The example worksheet provided in this appendix provides, as an aid for the reviewer, a process for documenting the basis for the assessment of the program 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.

The entire collection of the GALL Report AMP worksheets can be found at ADAMS Accession No. ML060950189. Table B-2 in the VYNPS LRA identifies the relationship of the VYNPS AMPs to the applicable GALL AMPs so that the appropriate worksheet can be selected by the project team reviewer.

**Audit Worksheet**  
**GALL Report AMP**

Plant: \_\_\_\_\_

LRA AMP: \_\_\_\_\_

Reviewer: \_\_\_\_\_

GALL AMP: X.E1, Environmental Qualification (EQ) of Electric Components

Date: \_\_\_\_\_

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description	A. The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of an EQ program. While a component life limiting condition may be due to thermal, radiation, or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, an unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to the station's quality assurance program requirements, which requires the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	B. All operating plants must meet the requirements of 10 CFR 50.49 for certain electrical components important to safety. 10 CFR 50.49 defines the scope of components to be included, requires the preparation and maintenance of a list of in-scope components, and requires the preparation and maintenance of a qualification file that includes component performance specifications, electrical characteristics, and the environmental conditions to which the components could be subjected.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
“	C. 10 CFR 50.49(e)(5) contains provisions for aging that require, in part, consideration of all significant types of aging degradation that can affect component functional capability. 10 CFR 50.49(e) also requires replacement or refurbishment of components not qualified for the current license term prior to the end of designated life, unless additional life is established through ongoing qualification.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
“	D. 10 CFR 50.49(f) establishes four methods of demonstrating qualification for aging and accident conditions.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
“	E. 10 CFR 50.49(k) and (l) permit different qualification criteria to apply based on plant and component vintage. Supplemental EQ regulatory guidance for compliance with these different qualification criteria is provided in the DOR Guidelines, Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors; NUREG-0588, Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment; and Regulatory Guide 1.89, Rev. 1, Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants. Compliance with 10 CFR 50.49 provides reasonable assurance that the component can perform its intended functions during accident conditions after experiencing the effects of inservice aging.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
“	F. EQ programs manage component thermal, radiation, and cyclical aging through the use of aging evaluations based on 10 CFR 50.49(f) qualification methods. As required by 10 CFR 50.49, EQ components not qualified for the current license term are to be refurbished, replaced, or have their qualification extended prior to reaching the aging limits established in the evaluation. Aging evaluations for EQ components that specify a qualification of at least 40 years are considered time-limited aging analyses (TLAAs) for license renewal.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
“	G. Under 10 CFR 54.21(c)(1)(iii), plant EQ programs, which implement the requirements of 10 CFR 50.49 (as further defined and clarified by the DOR Guidelines, NUREG-0588, and Regulatory Guide 1.89, Rev. 1), are viewed as aging management programs (AMPs) for license renewal. Reanalysis of an aging evaluation to extend the qualification of components under 10 CFR 50.49(e) is performed on a routine basis as part of an EQ program. Important attributes for the reanalysis of an aging evaluation include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met). These attributes are discussed in the "EQ Component Reanalysis Attributes" section.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
“	H. This reanalysis program can be applied to EQ components now qualified for the current operating term (i.e., those components now qualified for 40 years or more). As evaluated below, this is an acceptable AMP. Thus, no further evaluation is recommended for license renewal if an applicant elects this option under 10 CFR 54.21(c)(1)(iii) to evaluate the TLAA of EQ of electric equipment.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
EQ Component Reanalysis Attributes	A. The reanalysis of an aging evaluation is normally performed to extend the qualification by reducing excess conservatism incorporated in the prior evaluation. Reanalysis of an aging evaluation to extend the qualification of a component is performed on a routine basis pursuant to 10 CFR 50.49(e) as part of an EQ program. While a component life limiting condition may be due to thermal, radiation, or cyclical aging, the vast majority of component aging limits are based on thermal conditions. Conservatism may exist in aging evaluation parameters, such as the assumed ambient temperature of the component, an unrealistically low activation energy, or in the application of a component (de-energized versus energized). The reanalysis of an aging evaluation is documented according to the station's quality assurance program requirements, which requires the verification of assumptions and conclusions. As already noted, important attributes of a reanalysis include analytical methods, data collection and reduction methods, underlying assumptions, acceptance criteria, and corrective actions (if acceptance criteria are not met).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
“	<p>B. Analytical Methods: The analytical models used in the reanalysis of an aging evaluation are the same as those previously applied during the prior evaluation. The Arrhenius methodology is an acceptable thermal model for performing a thermal aging evaluation. The analytical method used for a radiation aging evaluation is to demonstrate qualification for the total integrated dose (that is, normal radiation dose for the projected installed life plus accident radiation dose). For license renewal, one acceptable method of establishing the 60-year normal radiation dose is to multiply the 40-year normal radiation dose by 1.5 (that is, 60 years/40 years). The result is added to the accident radiation dose to obtain the total integrated dose for the component. For cyclical aging, a similar approach may be used. Other models may be justified on a case-by-case basis.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No  Document(s) used to confirm Criteria:</p> <p>Comment:</p>
“	<p>C. Data Collection and Reduction Methods: Reducing excess conservatism in the component service conditions (for example, temperature, radiation, cycles) used in the prior aging evaluation is the chief method used for a reanalysis. Temperature data used in an aging evaluation is to be conservative and based on plant design temperatures or on actual plant temperature data. When used, plant temperature data can be obtained in several ways, including monitors used for technical specification compliance, other installed monitors, measurements made by plant operators during rounds, and temperature sensors on large motors (while the motor is not running). A representative number of temperature measurements are conservatively evaluated to establish the temperatures used in an aging evaluation. Plant temperature data may be used in an aging evaluation in different ways, such as (a) directly applying the plant temperature data in the evaluation, or (b) using the plant temperature data to demonstrate conservatism when using plant design temperatures for an evaluation. Any changes to material activation energy values as part of a reanalysis are to be justified on a plant-specific basis. Similar methods of reducing excess conservatism in the component service conditions used in prior aging evaluations can be used for radiation and cyclical aging.</p>	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No  Document(s) used to confirm Criteria:</p> <p>Comment</p>

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
“	D. Underlying Assumptions: EQ component aging evaluations contain sufficient conservatism to account for most environmental changes occurring due to plant modifications and events. When unexpected adverse conditions are identified during operational or maintenance activities that affect the normal operating environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
“	E. Acceptance Criteria and Corrective Actions: The reanalysis of an aging evaluation could extend the qualification of the component. If the qualification cannot be extended by reanalysis, the component is to be refurbished, replaced, or requalified prior to exceeding the period for which the current qualification remains valid. A reanalysis is to be performed in a timely manner (that is, sufficient time is available to refurbish, replace, or requalify the component if the reanalysis is unsuccessful).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
1. Scope of Program	A. EQ programs apply to certain electrical components that are important to safety and could be exposed to harsh environment accident conditions, as defined in 10 CFR 50.49 and Regulatory Guide 1.89, Revision 1.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment
2. Preventive Actions	A. 10 CFR 50.49 does not require actions that prevent aging effects. EQ program actions that could be viewed as preventive actions include (a) establishing the component service condition tolerance and aging limits (for example, qualified life or condition limit) and (b) where applicable, requiring specific installation, inspection, monitoring or periodic maintenance actions to maintain component aging effects within the bounds of the qualification basis.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
3. Parameters Monitored/ Inspected	A. EQ component qualified life is not based on condition or performance monitoring. However, pursuant to Regulatory Guide 1.89, Rev. 1, such monitoring programs are an acceptable basis to modify a qualified life through reanalysis. Monitoring or inspection of certain environmental conditions or component parameters may be used to ensure that the component is within the bounds of its qualification basis, or as a means to modify the qualified life.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
4. Detection of Aging Effects	A. 10 CFR 50.49 does not require the detection of aging effects for in-service components. Monitoring or inspection of certain environmental conditions or component parameters may be used to ensure that the component is within the bounds of its qualification basis, or as a means to modify the qualified life.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
5. Monitoring and Trending	A. 10 CFR 50.49 does not require monitoring and trending of component condition or performance parameters of in-service components to manage the effects of aging. EQ program actions that could be viewed as monitoring include monitoring how long qualified components have been installed. Monitoring or inspection of certain environmental, condition, or component parameters may be used to ensure that a component is within the bounds of its qualification basis, or as a means to modify the qualification.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
6. Acceptance Criteria	A. 10 CFR 50.49 acceptance criteria are that an inservice EQ component is maintained within the bounds of its qualification basis, including (a) its established qualified life and (b) continued qualification for the projected accident conditions. 10 CFR 50.49 requires refurbishment, replacement, or requalification prior to exceeding the qualified life of each installed device.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
“	B. When monitoring is used to modify a component qualified life, plant-specific acceptance criteria are established based on applicable 10 CFR 50.49(f) qualification methods.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:



Program Element	Auditable GALL Criteria	Documentation of Audit Finding
7. Corrective Actions	A. If an EQ component is found to be outside the bounds of its qualification basis, corrective actions are implemented in accordance with the station's corrective action program. When unexpected adverse conditions are identified during operational or maintenance activities that affect the environment of a qualified component, the affected EQ component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. When an emerging industry aging issue is identified that affects the qualification of an EQ component, the affected component is evaluated and appropriate corrective actions are taken, which may include changes to the qualification bases and conclusions. Confirmatory actions, as needed, are implemented as part of the station's corrective action program, pursuant to 10 CFR 50, Appendix B. As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the corrective actions.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
8. Confirmation Process	A. Confirmatory actions, as needed, are implemented as part of the station's corrective action program, pursuant to 10 CFR 50, Appendix B. As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the confirmation process.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
9. Administrative Controls	A. EQ programs are implemented through the use of station policy, directives, and procedures. EQ programs will continue to comply with 10 CFR 50.49 throughout the renewal period, including development and maintenance of qualification documentation demonstrating reasonable assurance that a component can perform required functions during harsh accident conditions. EQ program documents identify the applicable environmental conditions for the component locations. EQ program qualification files are maintained at the plant site in an auditable form for the duration of the installed life of the component. EQ program documentation is controlled under the station's quality assurance program. As discussed in the appendix to this report, the staff finds the requirements of 10 CFR Part 50, Appendix B, acceptable to address the administrative controls.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
10. Operating Experience	A. EQ programs include consideration of operating experience to modify qualification bases and conclusions, including qualified life. Compliance with 10 CFR 50.49 provides reasonable assurance that components can perform their intended functions during accident conditions after experiencing the effects of inservice aging.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

EXCEPTIONS

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

ENHANCEMENTS

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

DOCUMENTS REVIEWED DURING AUDIT

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

## **Appendix G**

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

## **Appendix G**

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

The example 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 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.

**AUDIT WORKSHEET**  
**GALL REPORT AMP**

**Plant:** \_\_\_\_\_

**LRA AMP:** \_\_\_\_\_

**Reviewer:** \_\_\_\_\_

**GALL AMP: Plant-specific Program** \_\_\_\_\_

**Date:** \_\_\_\_\_

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
Program Description		
1. Scope of Program	A. The specific program necessary for license renewal should be identified. The scope of the program should include the specific structures and components of which the program manages the aging.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
2. Preventive Actions	A. The activities for prevention and mitigation programs should be described. These actions should mitigate or prevent aging degradation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	B. For condition or performance monitoring programs, they do not rely on preventive actions and thus, this information need not be provided. More than one type of aging management program may be implemented to ensure that aging effects are managed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
3. Parameters Monitored/ Inspected	A. The parameters to be monitored or inspected should be identified and linked to the degradation of the particular structure and component intended function(s).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
"	B. For a condition monitoring program, the parameter monitored or inspected should detect the presence and extent of aging effects. Some examples are measurements of wall thickness and detection and sizing of cracks.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	C. For a performance monitoring program, a link should be established between the degradation of the particular structure or component intended function(s) and the parameter(s) being monitored. A performance monitoring program may not ensure the structure and component intended function(s) without linking the degradation of passive intended functions with the performance being monitored.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	D. For prevention and mitigation programs, the parameters monitored should be the specific parameters being controlled to achieve prevention or mitigation of aging effects.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
4. Detection of Aging Effects	A. The parameters to be monitored or inspected should be appropriate to ensure that the structure and component intended function(s) will be adequately maintained for license renewal under all CLB design conditions.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	B. Provide information that links the parameters to be monitored or inspected to the aging effects being managed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	C. Thus, the effects of aging on a structure or component should be managed to ensure its availability to perform its intended function(s) as designed when called upon.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	D. A program based solely on detecting structure and component failure should not be considered as an effective aging management program for license renewal.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
"	E. This program element describes "when," "where," and "how" program data are collected (i.e., all aspects of activities to collect data as part of the program).	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	F. Provide justification, including codes and standards referenced, that the technique and frequency are adequate to detect the aging effects before a loss of SC intended function. A program based solely on detecting SC failures is not considered an effective aging management program.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	G. When sampling is used to inspect a group of SCs, provide the basis for the inspection population and sample size. The inspection population should be based on such aspects of the SCs as a similarity of materials of construction, fabrication, procurement, design, installation, operating environment, or aging effects. The sample size should be based on such aspects of the SCs as the specific aging effect, location, existing technical information, system and structure design, materials of construction, service environment, or previous failure history.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	H. The samples should be biased toward concern in the period of extended operation. Provisions should also be included on expanding the sample size when degradation is detected in the initial sample.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
5. Monitoring and Trending	A. Monitoring and trending activities should be described, and they should provide predictability of the extent of degradation and thus effect timely corrective or mitigative actions. Plant-specific and/or industry-wide operating experience may be considered in evaluating the appropriateness of the technique and frequency.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	B. This program element describes "how" the data collected are evaluated and may also include trending for a forward look. This includes an evaluation of the results against the acceptance criteria and a prediction regarding the rate of degradation in order to confirm that timing of the next scheduled inspection will occur before a loss of SC intended function.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
"	C. The parameter or indicator trended should be described.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	D. The methodology for analyzing the inspection or test results against the acceptance criteria should be described.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	E. Trending is a comparison of the current monitoring results with previous monitoring results in order to make predictions for the future.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	E. Trending is a comparison of the current monitoring results with previous monitoring results in order to make predictions for the future.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
6. Acceptance Criteria	A. The acceptance criteria of the program and its basis should be described.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	B. The acceptance criteria, against which the need for corrective actions will be evaluated, should ensure that the structure and component intended function(s) are maintained under all CLB design conditions during the period of extended operation.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	C. The program should include a methodology for analyzing the results against applicable acceptance criteria.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:



Program Element	Auditable GALL Criteria	Documentation of Audit Finding
"	D. Corrective action is taken, such as piping replacement, before reaching this acceptance criterion.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	E. Acceptance criteria could be specific numerical values, or could consist of a discussion of the process for calculating specific numerical values of conditional acceptance criteria to ensure that the structure and component intended function(s) will be maintained under all CLB design conditions. Information from available references may be cited.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	F. It is not necessary to justify any acceptance criteria taken directly from the design basis information that is included in the UFSAR because that is a part of the CLB. Also, it is not necessary to discuss CLB design loads if the acceptance criteria do not permit degradation because a structure and component without degradation should continue to function as originally designed.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	G. Acceptance criteria, which do permit degradation, are based on maintaining the intended function under all CLB design loads.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
"	H. Qualitative inspections should be performed to same predetermined criteria as quantitative inspections by personnel in accordance with ASME Code and through approved site specific programs.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:
7. Corrective Actions	A. Corrective actions, including root cause determination and prevention of recurrence, should be timely.	Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No Document(s) used to confirm Criteria:  Comment:

Program Element	Auditable GALL Criteria	Documentation of Audit Finding
8. Confirmation Process	A. Confirmation process should ensure that preventive actions are adequate and that appropriate corrective actions have been completed and are effective.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
9. Administrative Controls	A. Administrative controls should provide a formal review and approval process.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>
10. Operating Experience	A. Operating experience with existing programs should be discussed. The operating experience of aging management programs, including past corrective actions resulting in program enhancements or additional programs, should be considered. A past failure would not necessarily invalidate an aging management program because the feedback from operating experience should have resulted in appropriate program enhancements or new programs. This information can show where an existing program has succeeded and where it has failed (if at all) in intercepting aging degradation in a timely manner. This information should provide objective evidence to support the conclusion that the effects of aging will be managed adequately so that the structure and component intended function(s) will be maintained during the period of extended operation.	<p>Consistent with GALL AMP: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Document(s) used to confirm Criteria:</p> <p>Comment:</p>

EXCEPTIONS

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

ENHANCEMENTS

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

Document Reviewed During Audit

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

## **Appendix H**

### **Aging Management Review Worksheets**

## **Appendix H**

### **Aging Management Review Worksheets**

The project team reviewer should document its AMR reviews determination in spreadsheets of the Table 1 and Table 2 AMR line items. The documentation should contain the same information as would have been captured in the Table provided in this appendix.

The project team reviewer should use the tables provided in this appendix if the electronic spreadsheet format is not used.

<b>VYNPS AMR Component (Table 1) Worksheet</b>		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 in Table 1 were reviewed and are addressed in the following table.

Item No.	Further Evaluation Recommended	Discussion

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

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

**References/Documents Used:**

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

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

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

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

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

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

**References/Documents Used:**

- 5.
- 6.
- 7.

## Appendix I

### Abbreviations and Acronyms

ADAMS	Agencywide Documents Access and Management System
AMP	aging management program
AMR	aging management review
ASME	American Society of Mechanical Engineers
B&PV	boiler and pressure vessel
BTP	Branch Technical Position
BWR	boiling water reactor
CASS	cast austenitic stainless steel
CII	containment inservice inspection
CLB	current licensing basis
CVUSE	charpy upper-shelf energy
DCI	Divisions of Component Integrity
DE	Division of Engineering
DLR	Division of License Renewal
EQ	environmental qualification
FSAR	final safety analysis report
GALL	Generic Aging Lessons Learned
GL	Generic Letter
HAZ	heat affected zone
ISG	interim staff guidance
ISG-LR	Interim Staff Guidance for License Renewal
ISI	inservice inspection
ISL	Information Systems Laboratories, Inc.
LRA	license renewal application
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
RAI	request for additional information
RLRC	License Renewal Branch C
RLSB	License Renewal and Standardization Branch
SC	structures and components



SER	safety evaluation report
SRP-LR	Standard Review Plan-License Renewal
SRV	safety relief valve
SSC	systems, structures, and components
TLAA	time-limited aging analysis
UFSAR	updated final safety analysis report
VY	Vermont Yankee
VYNPS	Vermont Yankee Nuclear Power Station